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# POULTRY MANAGEMENT.

BY

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## LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,  
BUREAU OF ANIMAL INDUSTRY,  
*Washington, D. C., March 11, 1907.*

SIR: I have the honor to transmit herewith, and to recommend for publication as a Farmers' Bulletin, a paper on Poultry Management, prepared by G. Arthur Bell, Assistant Animal Husbandman of this Bureau, being a condensation of an article written for the Twenty-second Annual Report of the Bureau. The paper is confined entirely to the chicken industry, as it was found that to treat thoroughly all phases of poultry raising would make a bulletin of undue length, and, furthermore, turkeys, ducks, geese, guinea fowls, etc., are covered in a satisfactory manner by other publications of the Department.

The bulletin has been prepared from the practical standpoint, and technicalities have been avoided as much as possible. In all respects the effort has been made to bring the discussion of methods and appliances down to date, including such subjects as dry feeding, curtain-front houses, colony houses, etc. The author has had practical experience in the poultry business since early boyhood as breeder, exhibitor, and judge, and during the past two years he has visited many successful poultry farms in the East. The methods used on some of these farms are described, and some of the houses and appliances are illustrated.

Acknowledgments are made to Prof. J. E. Rice, of the Cornell University Experiment Station; Mr. F. H. Stoneburn, Waterville, N. Y.; Prof. G. M. Gowell, of the Maine Agricultural Experiment Station, and Prof. W. P. Brooks, of the Massachusetts (Hatch) Experiment Station, for information and courtesies. The poultry press has also been very courteous, and the cooperation of many successful poultry raisers throughout the country has been of great value. Mr. Rob R. Slocum, Poultry Assistant in the Animal Husbandry Office of this Bureau, who entered the service after most of the work on the original article was completed, has assisted Mr. Bell in preparing the section on poultry diseases.

This bulletin will supersede Farmers' Bulletin 41 ("Fowls: Care and Feeding") and 141 ("Poultry Raising on the Farm").

Respectfully,

A. D. MELVIN,  
*Chief of Bureau.*

HON. JAMES WILSON,  
*Secretary of Agriculture.*

# CONTENTS.

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	Page.
Making a start with poultry .....	5
Classification .....	5
Egg breeds .....	5
Meat breeds .....	6
General-purpose breeds .....	6
Ornamental breeds .....	6
Houses and inclosures .....	6
Systems of housing .....	6
Location and construction of houses .....	7
Interior arrangements .....	10
Yards .....	12
Some successful houses .....	12
Continuous houses .....	12
Colony houses .....	17
Management of hens for egg production .....	19
Systems of feeding .....	20
Dry feeding .....	20
Mash feeding .....	21
Miscellaneous feeds .....	22
Grit and other substances .....	24
Methods of feeding .....	25
Frequency of feeding .....	25
Amount of feed .....	25
Importance of a varied ration .....	26
Effect of feed on character of egg .....	26
The droppings as an indication of health .....	26
Molting .....	26
Exercise .....	27
Age of birds for profitable egg production .....	27
Raising chickens .....	27
Number of females to one male .....	28
Hatching chicks .....	28
Eggs for hatching .....	28
Hatching chicks with hens .....	29
Incubators and brooders .....	30
Feeding and care of chicks .....	31
Broilers, roasters, and capons .....	34
Broilers .....	34
Roasters .....	34
Capon and caponizing .....	35
Fattening poultry .....	36
Pen fattening .....	36
Crate fattening .....	36
Machine cramming .....	37
Hand cramming .....	37
Feed for fattening .....	38

	Page.
Marketing poultry and poultry products.....	38
Killing, dressing, and packing poultry.....	38
Shipping live poultry.....	39
Sorting, packing, and shipping eggs.....	40
Testing eggs.....	40
Methods of selling.....	40
Preserving eggs.....	41
Diseases, bad habits, and insect pests.....	42
Importance of cleanliness.....	42
Diseases.....	42
Bad habits.....	47
Insect pests.....	47

## ILLUSTRATIONS.

	Page.
FIG. 1. Row of nests for laying hens.....	11
2. Feed trough.....	11
3. A continuous apartment house.....	13
4. Interior of a New York poultry house, showing duck-covered window.....	13
5. Curtained roosts and hinged nest boxes.....	14
6. A curtain-front house.....	15
7. A Connecticut poultry ranch.....	16
8. Laying house and open range.....	17
9. A colony house.....	18
10. "New Hampshire" form of poultry house.....	19
11. Nest for a sitting hen.....	20
12. A-shaped coop for hen and chickens.....	20
13. Box coop for hen and chickens.....	30
14. Cramming machine in operation.....	37

# POULTRY MANAGEMENT.

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## **MAKING A START WITH POULTRY.**

The safest way for those who are about to make their first attempt at poultry raising is to start in a small way with a few fowls, and learn the business thoroughly before making large investments. Mistakes will be made and many difficult problems will be presented for solution before success in any large measure will be attained. As soon as it is found to be a paying investment, more capital may be put into the plant.

Another good plan for the beginner who wishes to learn the art of poultry keeping is to secure a position with some successful poultryman. One or two years of work on a large, practical plant will be found a great help, as the methods of caring for the birds and of marketing the products can thus be learned better than in almost any other way.

The question is often asked as to what is the best time of the year for one to begin. When to begin is not very important, but the fall of the year is a good time, for then stock can be purchased for less money than at any other season. It is also advisable that the fowls be moved to their new quarters before they begin to lay.

If the beginner has had experience in poultry keeping, it will be all right to purchase eggs, otherwise he should begin with the fowls and thus gain some knowledge of caring for poultry before attempting to raise chickens.

## **CLASSIFICATION.**

For convenience, chickens may be classified as egg breeds, meat breeds, general-purpose breeds, and fancy or ornamental breeds.

### **EGG BREEDS.**

The egg breeds include the small or medium-sized fowls which are very active, quick to mature, producers of white-shelled eggs, usually nonsitters or at best but poor sitters, and rather poor mothers. The various varieties of Leghorns and Minorcas are good representatives of this class. Because they are poor sitters some other breed, or at least a few other fowls, should be kept if natural methods of incuba-

tion are to be employed. On account of their early maturity it is not uncommon for individuals to begin laying at the age of four and one-half months. As mentioned above, these breeds are very active and do not fatten as readily under ordinary conditions as the larger and less active breeds. The fowls of this class have large combs and wattles, which make them rather sensitive to low temperatures.

#### **MEAT BREEDS.**

The largest fowls are represented in this class, and these breeds are especially suitable for the production of large roasters. They are slow and somewhat sluggish in movement, with little desire for foraging, easily confined by low fences, rather slow to mature, persistent sitters, and rather indifferent layers of large brown-shelled eggs. Many poultrymen, however, are getting very good egg yields from them. The Brahmas, Cochins, and Langshans may be mentioned as belonging to this class.

#### **GENERAL-PURPOSE BREEDS.**

This class includes fowls which are of fair size and which will also produce a good quantity of brown-shelled eggs, making them especially adapted to the person wishing a supply of both eggs and meat. As one has to make frequent sales of flesh in the shape of surplus cockerels and hens, the carcass as well as egg production should be considered. The general-purpose breeds are usually good sitters and good mothers. They have medium-sized combs and wattles and endure cold weather well. They occupy a medium position between the egg and meat breeds as to size, egg production, and docility. The Plymouth Rocks, Wyandottes, Orpingtons, and Rhode Island Reds are good representatives of this class.

#### **ORNAMENTAL BREEDS.**

As a rule the breeds in this class are not so well adapted for farm purposes as are the breeds of the other three classes. The Polish, Exhibition Games, Silkies, Sultans, Frizzles, and Bantams are representative ornamental breeds.

A full description of the various varieties of fowls is given in Farmers' Bulletin No. 51, "Standard Varieties of Chickens."

#### **HOUSES AND INCLOSURES.**

##### **SYSTEMS OF HOUSING.**

In the manner of housing fowls we have two systems widely different in their extremes. At one extreme is the colony plan, shown in figure 7 (p. 16), which consists in placing small houses for small

flocks far enough apart to obviate the necessity of fences, thus giving free range with but little mingling of the different flocks. At the other extreme, we have the continuous apartment house shown in figures 3 and 6 (pp. 13 and 15). This kind of house consists of a series of separate pens, under one roof, opening directly into a hall way in the rear, or having doors between the pens without the hall way, or opening into a hall way and also into one another. There are several plans and arrangements between these two extremes which may be built to suit varying conditions.

The advantages of the colony plan are—first, small flocks on free range; second, no expense for fencing; third, there is less need for scrupulous attention to cleanliness and providing regular supplies of animal and vegetable feed during summer months. This plan, however, has the following disadvantages: First, extra cost of labor in caring for fowls in stormy weather, when it will often be difficult to get around to feed and care for the fowls regularly; second, houses built on the colony plan, if built as well, cost more than a continuous house of the same capacity, for partitions, which may be constructed largely of wire netting, are much cheaper than two end walls; third, the colony plan allows but about 100 birds per acre, while the continuous-house system, with suitable yards, allows 450 to 500 birds per acre.

#### LOCATION AND CONSTRUCTION OF HOUSES.

**Location of buildings.**—The first consideration is a suitable location for the poultry house or houses. If possible, it is best to select an elevation having a natural drainage away from the building, for damp ground means cold ground. If the house can be built in the lee of a wind-break or a hill, or in front of farm buildings, so much the better. A dry, porous soil, such as sandy or gravelly loam, is preferable to a clay soil, for the former is more easily kept in a sanitary condition. If it is impracticable to select a soil that is naturally dry, the soil should be made dry by thorough underdrainage. A purely sandy soil should not be selected, for a soil not good enough to support plant life is unfit for poultry.

As sunlight and warmth are essential to success, the buildings should face the south; other things being equal they will be warmer and drier. When a direct southern exposure can not be obtained a southeastern is preferable to a southwestern exposure, for fowls seem to prefer morning to afternoon sun. A gentle slope facing the south is the most suitable.

**When to build.**—It is best to build the houses during the spring or early summer, for then they have time to dry out during the hot days. Lumber is often rather damp and should be thoroughly dried out be-



fore winter. Cement floors and foundation walls will also have an opportunity to dry thoroughly, and thus may be avoided much of the dampness so often attributed to them.

**Size and dimensions of house.**—The size of the building required will depend largely on the number of fowls to be kept and on the size of the flocks. From 40 to 50 seems to be about as many as is safe and economical to keep together. With flocks of this size about 5 square feet of floor space should be allotted to each bird, which will suffice in most cases where careful attention is given to cleanliness and ventilation. If the fowls are kept in smaller flocks more floor space per bird will be needed. Where the climate is so mild that it is unnecessary to keep the fowls confined, except for a few days at a time, less space per bird will be sufficient. The smaller breeds, being more active and restless, require about as much room as the larger breeds.

For the greatest amount of floor space for the least cost, a building should be square, for, other things being equal, the nearer square a house is the less lumber it will take. It is, however, out of the question to have a large house built square.

The building should not be so wide that the sun can not reach the back of the house, otherwise it will be damp. Fourteen feet is a convenient width if there are no alleyways.

The house should be built as low as possible without danger of the attendants bumping their heads against the ceiling. A low house is more easily warmed than a high one.

**Foundation walls.**—When permanent houses are to be built it is usually most economical to erect them on foundations made of brick, stone, or concrete. These should be built deep enough to prevent heaving by frost and high enough to prevent surface water from entering. Where large stones or bricks are not readily available good walls may be made from small stones. In case none of these foundation materials is available the building may be erected on posts.

**The roof.**—There are three general styles of roofs—the single pitch, shown in figure 9 (p. 18); the gable roof, or double pitch with equal sides, shown in figure 3 (p. 13), and the combination, with one long and one short pitch, shown in figure 6 (p. 15).

The single-pitch roof is the easiest to build. It gives the highest vertical front exposed to the sun's rays and throws all the rain water to the rear; but in order to have the back wall of sufficient height to allow a person to work conveniently in the rear portion of the house it is necessary to have the front wall very high—unless a very slight pitch is used—which requires much more lumber for the front side than in the case of the other two styles. The gable roof provides for a garret space, which may be filled with straw, thus helping to make the house warm and dry.

It takes the same amount of material to build any one of the roofs mentioned if the pitch of the roof and the ground plan are similar. Most roofs can be one-fourth pitch. Shingle roofs, however, should generally be one-third pitch. In any case the steeper the pitch the greater will be the cost of roofing and the longer the roof will last.

There are several prepared roofing materials which are good, or the roof may consist of matched lumber or shingles.

**Floors.**—The floor may be of earth, wood, or cement. It is important that the floor be dry, otherwise it will be impossible to keep litter on the floor fit for use. Straw and similar material gathers moisture, and when the litter becomes damp enough to be limp it is practically useless for fowls to scratch in for their grain feed.

Earth floors are excellent, provided they are kept dry. Except in very dry climates, however, they are apt to be damp. Where an earth floor is used it should be 3 or 4 inches above the level of the ground outside. An objection to earth floors is the difficulty of cleaning them, for it is usually necessary to remove 2 or 3 inches of the top and to replace this with fresh soil, and even then one can not be certain that all of the droppings have been removed.

Board floors are usually short-lived unless air is allowed to circulate under them. This may be provided for by means of openings in the foundation walls, which should be closed during the winter months. A board floor covered with one-fourth inch of fine sand, with scratching material on this, makes a good floor. The litter and sand can be readily removed when desired and fresh materials provided. If the wooden floors are constructed within 2 or 3 inches of the ground it is essential that the foundation walls be constructed in such a way that rats can not gain access beneath the floor.

A good cement floor is the best, for it is easily cleaned and very durable. It should be covered with one-fourth or one-half inch of fine soil or sand and plenty of litter. In constructing this floor the ground should be excavated to the depth of 3 or 4 inches and then filled in with small stones or coarse gravel to make a good foundation. Cover with about 2 inches of mortar, made by mixing thoroughly, while dry, one part of good cement to three or four parts of sand, and then wetting with water and mixing thoroughly.

Further details regarding the construction of cement floors are given in Farmers' Bulletin No. 235, "Cement Mortar and Concrete."

**Windows.**—Too much glass makes a house cold at night and during the winter months and warm during the summer days. One square foot of glass surface should be allowed to about 16 or 18 square feet of floor space. The windows should be placed high and vertical rather than horizontal, for if the windows are placed low the sunlight will not reach the rear portions of the floor space, especially during

the winter when the sun is lowest. An 8 by 10 inch glass is a good-sized light used in a 12-light sash, making the sash about 3 feet 10 inches by 2 feet 5 inches. A 10 by 12 inch glass is another good-sized light to be used in an 8-light sash, making the sash about 4 feet 5 inches by 2 feet. Use two of these sashes for a house having about 250 square feet of floor space. In the coldest parts of the United States it is well to double glaze the windows, leaving one-fourth or one-half inch space between the glass.

**Quality of construction.**—It is not necessary to build expensive houses, but they should be serviceable, fairly roomy, well lighted, and well ventilated without drafts. The house should be built with a view to simplicity, economy, and convenience, and should be constructed according to the location and climatic conditions.

The walls may consist of (1) one thickness of boards, matched or unmatched; (2) one thickness of boards, matched or unmatched, covered with one or two thicknesses of building paper or roofing; (3) one thickness of boards covered with paper, then shingled or covered with lapped siding or matched lumber, making a solid double wall; (4) double boards with dead air space between; (5) double boards with space between filled with straw, hay, or other similar material. The second and third methods are the most common.

#### **Interior Arrangements.**

As far as possible interior fixtures should be so constructed as to permit them to be readily removed and cleaned.

**Roosts.**—A 2 by 3 inch scantling set edgewise with the upper edge slightly rounded makes a satisfactory perch. Allow 7 to 10 inches for each fowl; that is, a perch 16 feet long would furnish room enough for 20 fowls. A smooth platform should be placed under the perches to catch the droppings. The perches should be from 6 to 10 inches above this platform so as to allow the droppings to be removed without removing the perches. It is usually desirable to have the platform some distance from the floor, from 2 to 3 feet, in order that all the floor space may be available. If the roosts are located at the rear of the building it is possible to reduce the size of the roosting apartments at night by having a curtain swung from the ceiling which may be hung up against the ceiling during the day. A curtain of heavy unbleached muslin or duck tacked to a light wooden frame will be found very useful on cold nights in the Northern States.

**Nests.**—The nests should be situated in a more or less dark place, for then the hens will be less apt to eat the eggs. A good place is directly beneath the roost platform, with the nests so arranged that the hen enters from the side toward the wall. Each nest should be from 12 to 14 inches square, and high enough (about 12 or 14 inches)

to be convenient for the hen to enter. The partitions between the nests should be high enough to prevent the hens from rolling the eggs from one nest to another, and low enough to permit hens to go from one nest to another, otherwise they will fight and eggs will be broken. Fine hay or straw makes a good nesting material.

**Dust boxes.**—Chickens never wash, as many other birds do, but cleanse themselves of insects by wallowing in soil. Where board or cement floors are used, some means for dusting should be provided during the winter months. For a flock of 50 to 60 fowls a dust box 3 by 5 feet or 4 by 4 feet will be found large enough in most instances, and should be placed where it can be reached by sunlight during as much of the day as possible.

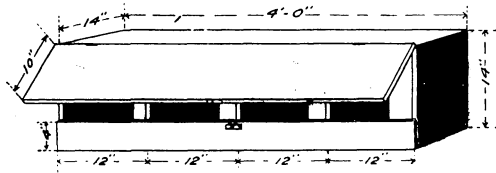


FIG. 1.—Row of nests for laying hens.

Fine, light, dry dust is the best, but sandy loam is good. Road dust is recommended by many, but it is apt to be filthy. Coal or wood ashes may be mixed with the soil if desired.

**Drinking fountain.**—The water receptacle should be large enough to hold plenty of water to last twenty-four hours, so that the fowls will never suffer for the lack of water, and should be elevated a little above the floor to prevent the water from becoming dirty, as it would otherwise. Drinking vessels should be carefully rinsed when fresh water is given.

**Feed trough and grit boxes.**—In figure 2 is shown an easily and cheaply constructed feed trough, which is so constructed that the fowls can not get into it with their feet and soil the feed.

Several small boxes for shell, grit, beef scraps, etc., should be fastened against the wall at a convenient distance (12 to 16 inches) above the floor, where the fowls can have constant access to them.

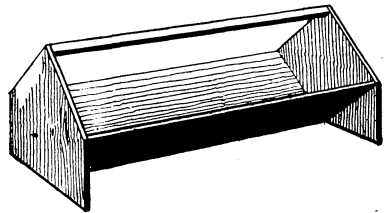


FIG. 2.—Feed trough.

**Ventilation.**—As it is better to have a cold dry house than a warm damp one, some means of ventilation should be provided. There is no better way to ventilate than by opening doors and windows as much or little as weather conditions require, but in all cases care should be taken to avoid any drafts. A cloth curtain over an opening has proved a very successful method of ventilation.

**YARDS.**

If convenient, it is well to have double yards, for then one may rotate green crops. The yards may be sown to clover, rye, bluegrass, etc., and while the fowls are using one yard the green feed in the other is getting a fresh start.

If the yards are to be on only one side of the house, they should be on the south side in order that the fowls may have the benefit of the first dry ground in early spring. It not infrequently happens that in localities where snow is abundant the ground on the south side is dry many days before that on the north side.

If the yards are to be in permanent sod and are to furnish green feed for the fowls, 70 to 80 square feet should be allowed for each bird. If part of the green feed is to be otherwise provided for, and the yards used mainly for exercise grounds, 35 to 40 square feet per bird will be sufficient.

Wire netting, 2-inch mesh, is suitable for fencing and can be bought cheaply. Where several runs are adjoining, the fences must be boarded up at the bottom to a height of 2 to 2½ feet to prevent the males fighting with one another. Height of fences will need to be regulated by the variety of fowls. The heaviest breeds, like the Brahmas, may be restrained by a 4-foot fence, while most of the other breeds can be kept in by a 6-foot fence. Some of the Hamburgs and Leghorns, however, need an 8-foot or 10-foot fence. Gates should be provided in order to permit access from one yard to the next.

Shade of some kind should be provided, and this can often be advantageously furnished by planting fruit trees (such as pear, plum, cherry, and apple) in the yard.

**SOME SUCCESSFUL HOUSES.**

In the preceding pages some of the important principles of house construction and of the internal arrangements of the house have been given, leaving it to the individual to choose the kind of house best adapted to his purpose. There is no one house which is best for all locations and for all purposes. In the following pages some descriptions of practical houses in actual use are given. Some of these houses are expensive and others are cheap. It is impossible to give an approximate cost of any house for all sections of the country, because the cost of material and labor varies so greatly.

**Continuous Houses.**

In figure 3 is shown a long continuous house in use at the White Leghorn Poultry Yards, in New York State. It is 250 feet long by 16 feet wide and 7 feet high at the eaves. Along the north side is

a 4-foot passageway, which is separated from the pens by a matched-board partition. The house, exclusive of this passageway, is divided into 20 pens 12 by 12 feet and a feed room 10 by 12 feet. A door opens from the passageway into each pen, and there is also a door in each partition between the pens. These partitions consist largely of

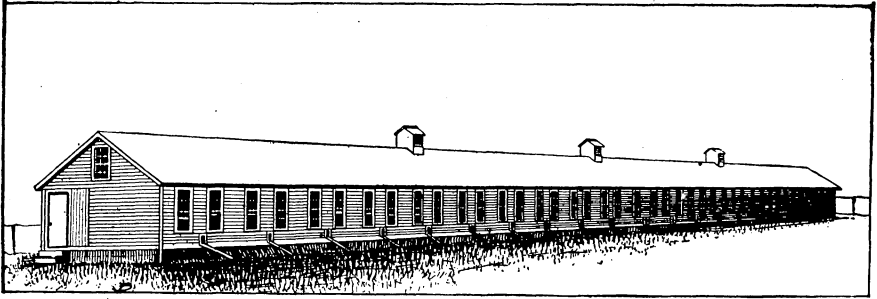


FIG. 3.—A continuous apartment house.

wire netting, but all are boarded up to a height of  $2\frac{1}{2}$  feet from the floor, in order that males in the adjoining pens may not fight through the wire, and thus injure each other. Several of the partitions in the house are boarded up solidly from floor to ceiling to prevent the drafts which are so likely to be found in long houses.

In the front or south side of each pen are placed two windows, each

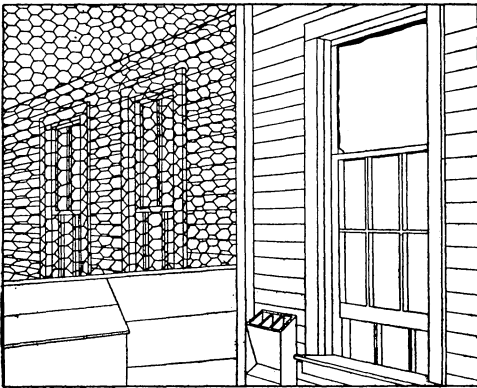


FIG. 4.—Interior of a New York poultry house, showing duck-covered window.

window consisting of two 12-light sashes. The windows are arranged to slide up and down as in an ordinary dwelling, special care being exercised to have them move freely in order that they may be opened at any time, regardless of weather conditions. Unless this point is considered the windows are very apt to become frozen in on the arrival of cold weather, and it becomes difficult to open them, hence the ventilation

is frequently neglected. During the past winter one window in each pen was arranged as shown in figure 4, the upper sash being dropped to the window sill and the opening thus made covered with a piece of 8-ounce duck, the latter being tacked to the upper bar of the lower sash and to the sides and top of the window frame. In extreme cold

weather the lower sash is slipped up to the top of the window, thus effectually closing it. This method proved to be very satisfactory, the house being unusually dry and the birds appearing to be in excellent health.

The roosting platform (see fig. 5) is placed in the rear of each pen, and at the front of each platform is hung a duck curtain operated by means of cords run through rings attached to the ceiling. This additional protection effectually prevents the freezing of Leghorn combs in all except the most severe winter weather. The nests are directly under the platforms and are entered from the rear. The bottoms of the nests are attached to one side by means of hinges and are held in place by a number of hasps. To clean the nests it is simply necessary to unfasten the hasps and the entire bottom swings downward.

The floor consists of matched boards. The outside of the studs of the walls are first boarded, then covered with paper and clapboarded. The inside of the studs is covered with matched boards, making a 4-inch dead air space between the two walls. The ceilings are made of matched boards. Over each pen in the ceiling is a trapdoor about 20 by 24 inches opening into the attic. At each end of the attic is a window, and at regular intervals along the peak of the roof are venti-

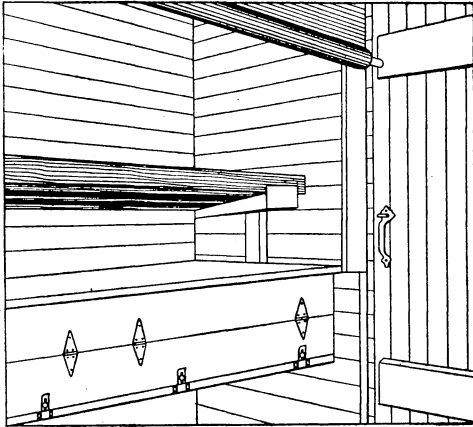


FIG. 5.—Curtained roosts and hinged nest boxes.

lating cupolas. Straw may be placed in the attic, thus providing an effective means of absorbing the moisture.

In figure 6 is shown one of the curtain-front houses in use at the Maine Experiment Station. Fresh air has been a big consideration in the building of this house, which has a curtained front to the house proper and a curtain-front roosting room. Professor Gowell, expert in charge of poultry raising at this station, has found this method of ventilation very satisfactory.

The building is 120 feet long and 16 feet wide. The front wall is  $6\frac{3}{4}$  feet and the rear wall  $5\frac{1}{2}$  feet high from the floor to the top of the plate. The roof is of unequal span, the ridge being 4 feet in from the front wall, and the height of the ridge above the floor is 9 feet. The sills are 4 by 6 inches and rest on a rough stone wall. The floor, consisting of two thicknesses of hemlock boards, rests on 2 by 8 inch tim-

bers, which are placed 2 feet apart. The rest of the frame of the building consists of 2 by 4 inch material. The building is boarded, papered, and shingled on both roof and walls, and in addition the rear wall and 4 feet of the lower part of the rear roof are ceiled on the inside of the studding and the space packed with dry sawdust. Outside of the building a 3-foot platform extends across the ends and along the front.

The house is divided into four 30 by 16 foot pens. In the front side of each pen are two 12-light windows and a door  $2\frac{1}{2}$  feet wide. The space between the window and door comes close up to the eaves, leaving an unbroken front 3 feet high below the eaves. The opening is 3 by 14 feet and is covered by a wooden frame, covered with 10-ounce duck. This curtain is hinged at the top and is swung in when opened, and it is always kept open, except on stormy days and

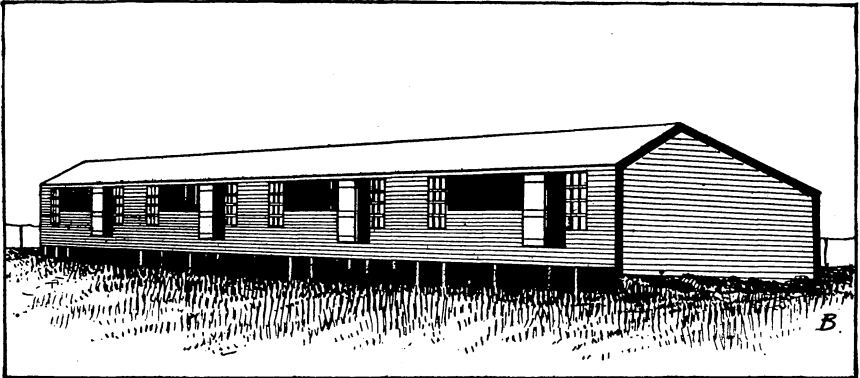


FIG. 6.—A curtain-front house.

winter nights. Each pen is of suitable size to accommodate 100 fowls, thus allotting 4.8 square feet of floor space to each bird.

A roost platform 4 feet 10 inches wide and 3 feet above the floor extends along the rear side for the entire 30 feet. Three perches of 2 by 3 inch material are placed on edge 10 inches above the platform. The rear perch is 11 inches out from the wall, and the space between the perches is 16 inches, which leaves 15 inches between the front perch and the duck curtain. The two curtains in front of the roost are each 15 feet long and 30 inches wide. They are hinged at the top, and open out into the room and fasten up when not in use.

At one end of each pen are placed 12 trap nests and 8 at the other end. Several small boxes are placed against the wall  $1\frac{1}{2}$  feet above the floor for shell, grit, bone, etc. The doors between the pens are wooden frames covered with 10-ounce duck and are hung with double-action spring hinges, so as to open in either direction. Tight board partitions are used between the pens to avoid drafts.



The chief point about this house is that only two cloth curtains are between the birds and the night air, it being located in a cold climate where the mercury often falls considerably below zero in winter. The floor is covered to the depth of 6 or 8 inches with straw, and some grain scattered in the litter early in the morning induces the birds to exercise as soon as they leave the roost. It would be unwise to open the curtains of the roosting pen and let the birds into the cold atmosphere of the room without some inducement to work.

In figure 7 are shown the houses of Mr. Tillinghest's plant in Connecticut. Each house is 10 by 20 feet, 4 feet high at the eaves, and  $6\frac{1}{2}$  feet at the center. The whole construction, including the roof, is of 1-inch cypress boards, matched. The floors consist of earth, and are



FIG. 7.—A Connecticut poultry ranch. Note arrangement of colony houses, which does away with necessity of fences.

not found damp, owing, no doubt, to the excellent natural drainage. The only fixture in each of these houses is a hopper having a capacity of about  $1\frac{1}{2}$  bushels for wheat screenings, a small hopper for beef scraps, and 4 or 5 soap boxes for nests. In the rear of the house are placed 3 or 4 perches about 3 feet from the ground. No board for droppings is used.

The great point at this plant is the simplicity and economy of labor in caring for the birds. Nature has greatly aided the owner by providing not only excellent drainage, but also a fine stream, which furnishes plenty of water and serves as a natural fence. The elevated ground abounds with wild berries, and insects are usually plentiful during the summer.

The supply of grain in summer consists of wheat screenings fed

from self-feeding hoppers, which are usually filled but once a week. A small quantity of beef scraps is fed in the afternoon, when the eggs are gathered. The fowls get their supply of water by going to the creek in both winter and summer. In winter a little cracked corn is added to the wheat screenings, and beef scraps are accessible to the fowls at all times.

Figure 8 shows one of the winter laying houses at H. J. Blanchard's farm, in New York State. This building is 40 feet long and 16 feet wide, the distance from the floors to the eaves being 7 feet. The walls are double, with a 4-inch space filled with straw. On the south side are 6 double-glazed sashes, which make a warm house for the

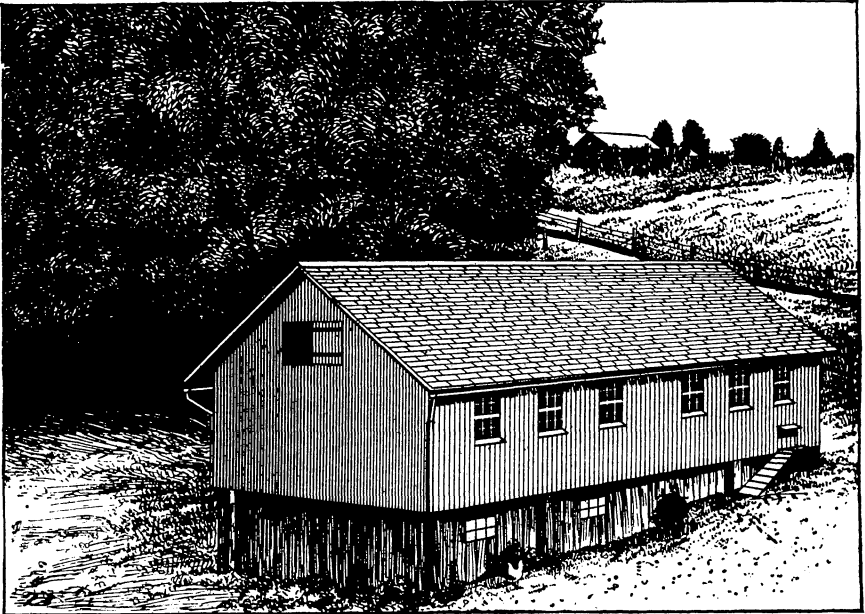


FIG. 8.—Laying house and open range.

cold northern portions of the United States. There is a loft with slatted ceiling filled with straw, which absorbs the moisture from below. At each end of the loft is a door which is opened on warm days to allow the straw to dry out. Below the floor is a basement, which furnishes an ideal scratching shed for winter use. To the rear of this house is a small grove, which furnishes plenty of shade, and about 20 feet from the front of the house is a stream of water.

#### Colony Houses.

Figure 9 shows one of the colony houses for chickens in use at the poultry farm of White & Rice, in New York State. This house is

about 8 feet long and 7 feet wide, 7 feet high in front and  $3\frac{1}{2}$  feet in rear. The walls are built of one thickness of matched boards. The floor is of wood. A hover is placed in this house, and the chicks are placed here when first hatched. When the chicks are from 6 to 10 weeks old (depending largely on weather conditions and the development of the chicks), the heater is removed and perches are placed in the rear of the house about 16 or 18 inches above the floor.

Figure 10 illustrates a "New Hampshire" house, one of many such houses in use on Mr. Hicks's poultry farm in Massachusetts. This

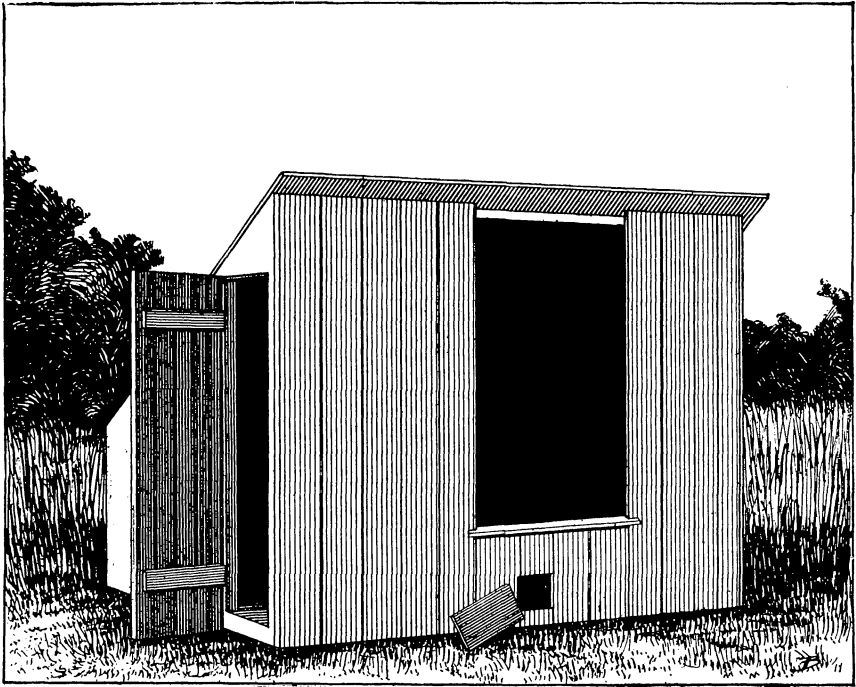


FIG. 9.—A colony house.

building is about 9 feet long and 7 feet wide, and about 6 feet high at the center and 18 inches at the eaves. The door is covered with fine wire netting, so as to provide for light and ventilation. If desired, the door can be covered with a muslin curtain, which can be swung open during the day and on warm nights. Such a house will accommodate 10 to 15 fowls according to amount of yard room, breed, etc. This house is portable, and can be readily moved from place to place. The chief recommendation of a house of this shape is the economy of labor and material needed to build it.

## MANAGEMENT OF HENS FOR EGG PRODUCTION.

The problem of feeding is one of great importance, and should be carefully considered, for on it depends to a large extent not only the general health of the birds, but also the economy which promotes success. It is a subject, however, which should be studied with a large amount of common sense, for there are no hard and fast rules which can be laid down as applying to every case. The price of feeds and the general environment should be considered in determining the right rations.

For the largest profit a good proportion of the eggs should be secured during the winter. If two extra eggs per week can be obtained from each hen a good profit will be made, while if the product is increased by only one egg per week in winter, this one egg will pay for all the feed the hen eats. To obtain this greater production, not only should the fowls be young and of a good laying breed, but the feeder should have a full knowledge of the proper feed and its preparation.

The nutriment in the feed of laying hens serves a

twofold purpose—to repair waste and furnish heat to the body and to supply the egg-making materials. As only the surplus over what is needed for the body is available for egg production, the proper feeds should be fed in sufficient quantities to induce this production.

In supplying feed to fowls there are three kinds of constituents which should be present in certain fairly well fixed proportions if the desired results are to be obtained most economically. These constituents are mineral, nitrogenous, and carbonaceous, all of which are contained in corn, wheat, oats, and barley, but not in the right proportions to give the greatest egg yield. In addition some animal feed and green feed should be supplied.

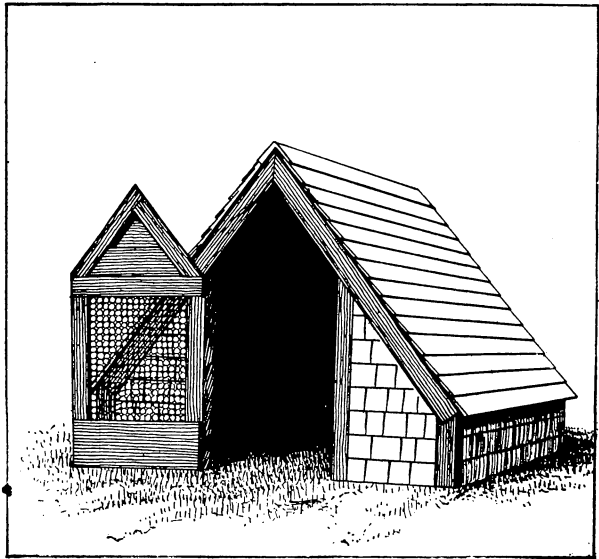


FIG. 10.—“New Hampshire” form of poultry house.

In feeding poultry a valuable lesson may be learned from nature. In the spring the production of eggs on the farm is an easy matter. Fowls which are at liberty to roam find an abundance of green and animal feed on their range, which with grain furnishes a perfect ration for laying hens. In addition to this they get plenty of exercise and fresh air. So far as lies within his power, then, the feeder should aim to make the winter conditions springlike.

### SYSTEMS OF FEEDING.

There are two systems in use for the feeding of fowls, in one of which all the feed is given dry and in the other of which one or more of the daily feeds consists of a moistened mash. For convenience they may be termed the "dry-feed" and the "mash" systems, although in the dry-feed system a dry mash is often fed.<sup>a</sup> Dry feeding is used by many where it is not convenient to make and feed a moistened mash. The greatest advantages to be derived from the dry system are the saving of labor and the lessened danger of bowel trouble resulting from sloppy or soured mashes.

#### Dry Feeding.

In the dry-feed system for laying hens, as successfully practiced on a New York poultry farm, the whole grains fed are as follows, in the proportions indicated:

200 pounds cracked corn.  
360 pounds wheat.  
130 pounds oats.

This mixture is scattered in the litter early in the morning and again at about 11.30 a. m., and this induces abundant exercise.

A hopper containing a dry mash is hung against the wall. The mash is made up of the following ingredients, in the proportions indicated (by measure):

32 parts corn meal.  
30 parts meat (animal) meal.  
30 parts ground alfalfa.  
2 parts oyster shell.  
1 part grit.  
1 part charcoal.

The hopper containing this mash is opened about an hour after the noon feed of grain, or about 12.30 p. m., and the fowls have access to it for the remainder of the day.

Of all grain feeds that are usually supplied to farm poultry, corn has been and still is the most popular, which is probably due to its

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<sup>a</sup> By the term "mash" poultrymen mean a mixture of ground feed, which may be either moist or dry.

abundance and relative cheapness, and because it is the most relished of all the grains. Corn is heating and fattening, and when fed to closely confined fowls in large quantities fat rather than eggs is the usual result, and it should be balanced with meat, bone, linseed, gluten, and such feeds as are rich in nitrogenous matter, for corn is deficient in this constituent. When corn is fed to laying hens that have opportunity to take plenty of exercise and to secure insects and green feed, much more satisfactory results are likely to be obtained than when it is fed to the same fowls closely confined. It may be fed quite largely in the cold climates during winter, but should be fed sparingly during summer.

Wheat is generally considered the safest grain to be fed alone. It is not quite so fattening as corn, still is too fattening when fed alone. This grain should be supplemented by some meat feed or skimmed milk to increase the proportion of protein. Wheat contains more protein than corn, about the same amount of carbohydrates, but less fat, and on the whole is considered not so valuable for fattening, but better for growth. Wheat screenings, if they are of a good grade, can frequently be purchased and fed to advantage. Of course there is always the danger of introducing weed seed on the farm. "Burnt wheat" can seldom be fed advantageously, the difference in price between this and good wheat being usually too slight to warrant one in feeding it.

Oats are often fed for variety, but are not well liked unless hulled, the hulls being tough and rather indigestible. Hulled oats, on the other hand, are relished by poultry and are excellent for producing eggs. When they can be obtained at a reasonable price in comparison with other grains they may be fed quite largely.

Barley does not seem to be greatly relished by hens, but may be used to give variety to the grain ration. It has a little more protein than corn and a little less than oats.

Buckwheat is quite well liked by fowls, but is not very widely fed. It may be fed to vary the ration. Buckwheat middlings are rich in protein and make a good mixture with corn meal.

Rye is not fed largely, and does not seem to be much relished by poultry. It is supposed to cause bowel trouble when fed freely.

#### **Mash Feeding.**

It is the practice of a large percentage of the most successful poultrymen to feed a part of the daily grain ration ground. Most of them feed the ground grain moistened with either milk or water, although some feed it dry. A fowl's gizzard is capable of grinding all kinds of grain, but it is generally considered to be more economical to have a part of the grinding done by steam or water power.

The soft-feed idea, however, must not be overworked. A beginner often reasons that it is cheaper for the miller than for the fowl to grind the grain; but the powerful muscles of the gizzard are there to be used, and experience has shown that the balance of power of functions in the fowl's economy makes the vigorous exercise of the gizzard beneficial. When feeding moistened ground feed have it a comparatively dry, crumbly mash, and not a thin slop. Give what they will eat readily in 15 or 20 minutes.

Poultrymen do not agree as to the time of day when the soft feed should be fed. Some assert that it should be fed in the morning, others at noon, and still others at night. The greater proportion give the ground feed in the morning, a large number at night, and a few at noon. The number who feed at noon, however, is becoming larger. Those who give the soft feed in the morning reason that the fowls which have been on the perches during the night have largely digested the feed consumed the day before, and consequently have comparatively empty crops and digestive organs, and in order that the morning meal may be easily and quickly digested the fowls should be fed only ground and moistened feed. Other careful feeders state that if a moistened mash is fed in the morning the hen is likely to become gorged with feed early in the morning and take to the roost for the remainder of the day. It is probably more important that a part of the grain should be ground than that it should be fed at any particular time of day. In an experiment in West Virginia the egg production was practically the same whether mash was fed in the morning or at night.

The following are given as sample mashes:

100 pounds corn meal.	100 pounds corn meal.
150 pounds ground oats.	100 pounds ground oats.
150 pounds wheat bran.	100 pounds wheat bran.
30 pounds linseed meal.	100 pounds wheat bran.
30 pounds beef scraps.	100 pounds corn meal.
100 pounds wheat bran.	75 pounds wheat middlings.
100 pounds ground corn.	75 pounds cut clover or alfalfa.
100 pounds ground oats.	
100 pounds ground barley.	

#### MISCELLANEOUS FEEDS.

**Animal feed.**—Chickens eat a large amount of animal matter in the form of insects, worms, and other low forms of animal life when allowed to range at will. If the poultry keeper is to get the best results from his fowls in winter he must furnish a substitute for this class of feed. For this purpose green cut bone, meat scraps, and animal meal may be used. Green cut bone is usually fed by itself, while the scraps and meal may be readily mixed with the mash. Cut

bone consists of green or fresh bone sliced or shaved into thin pieces by a bone cutter. Bones fresh from the butcher have more or less meat adhering, and the more of such meat the better, for the combination of bone and meat is excellent for producing eggs. Where a good supply of fresh bone can be obtained regularly it is very useful, but it can not be kept sweet for such long periods as the beef scraps and animal meal. Green cut bone should be fed carefully and in a sweet condition, otherwise bowel trouble may result. One pound a day is sufficient for 20 hens, but not over one-half pound should be fed to that number when first beginning to feed it. From one-half to three-fourths pound of animal meal or meat scraps may be fed to 12 or 15 hens. Any form of meat is likely to loosen the bowels of the hen when first fed, and the hens should be watched carefully and not fed too much. After the fowls have become accustomed to the animal meal or meat scraps it may be kept constantly before them.

**Green feed.**—If the best results are to be obtained with poultry they must be furnished with a plentiful supply of green feed. Where fowls have unlimited range on a farm they will secure green feed during the spring, but during the winter it must be supplied for them. The question of how to supply the best feed at the least cost is one that each poultry keeper must decide largely for himself. It will probably make but little difference what kind of green feed is supplied provided it is relished by the fowls. Cabbages, turnips, beets, potatoes, etc., are suitable for this purpose. The larger roots and the cabbages may be suspended by means of a wire or string, or they may be placed on the floor, in which case it would be well to split the turnips or beets lengthwise with a large knife. Potatoes and turnips should be fed cooked. The mangel is an excellent root for feeding raw. Cut clover soaked in boiling water fed alone or with the mash is good. Clover meal and ground alfalfa make very good feeds for this purpose. Where the fowls are yarded and not enough green feed is furnished by the yards, a small patch of clover, alfalfa, or rape may be sown. Any one of these, if frequently mowed, will furnish a great quantity of green feed in a form which is relished by the fowls. Canada field peas may also be sown for this purpose, and when fed in a tender, crisp condition are eaten readily. Rye is a good crop for late fall and early spring, for it will germinate and grow in very cold weather and will live through the winter. As a general thing, fowls should have once a day about all the green feed they will eat.

**Hay.**—Clover hay may be fed economically to laying hens and may be prepared as follows: Cut into as short lengths as possible (one-fourth to one-half inch) and place in a bucket. Then pour boiling water over it and allow to stand for two or three hours or over night.



When ready to feed, drain off the water and mix the hay with the mash. The hay may constitute about one-half the bulk of the feed, although the exact proportion is immaterial. Clover hay is best, but any kind is valuable. The feeder must be careful not to give too much bulky feed, for the hen, having a small crop, can not make use of as large an amount of it as the cow and other ruminants can.

**Water.**—Plenty of fresh water should always be accessible to the hens. If supplied irregularly they are likely to drink too much at a time. It should not be exposed to the sun's rays in summer or be allowed to freeze in winter if this can be avoided. In very frosty weather it is often worth while to give them slightly warmed water two or three times a day rather than permit them to drink water at the freezing point. A flock of 50 hens in good laying condition will require 4 to 6 quarts of water a day.

**Milk.**—When properly fed, milk makes an excellent feed for poultry. In feeding sour milk or buttermilk, however, the feeder must exercise care not to give too much or bowel trouble will likely result. Skimmed milk is an economical feed. In skimming, the most valuable food constituents—the nitrogenous substances—are left in the skimmed milk. Not only does this skimmed milk contain much nutritive material, but it contains it in a form which, as a rule, is easily digested. Skimmed milk may often be advantageously substituted in part for meat. Milk may be used in mixing the soft feed, or it may be given the fowls to drink in addition to water.

#### GRIT AND OTHER SUBSTANCES.

**Grit.**—Grit is essential to the health of fowls and to economy in feeding. Grit takes the place of teeth in preparing the feed for further digestion and is required for the proper preparation of feed in the gizzard. When the feed is not properly taken care of in this organ an undue strain is thrown on the fowl's system, often resulting in disease, and also allowing much of the nutriment to pass through the bird's body without being absorbed. In every pen or yard a box of grit should be kept. Recent investigators have asserted that grit is a part of the necessary feed, giving the fowls strong bones and a bright plumage.

**Lime.**—Ordinarily, the hen does not consume enough lime to form the shells of eggs if she is laying abundantly unless something besides the ordinary grain feeds is accessible to her. Oyster shells are very good for this purpose. A box of crushed shells may be placed before the fowls, allowing them to eat at will. Old mortar and fine gravel are also useful in supplying lime.

**Charcoal.**—Charcoal has a great absorptive power for gases, impurities, and acids, and thus acts as a corrective when the stomach is sour and digestion has been impaired.

#### METHODS OF FEEDING.

Fowls should have empty crops in the morning, and the crops should never be quite full until it is time to go to roost at night. For the first feed, grain scattered in the litter early in the morning is preferred, the sooner the better after the birds leave the roosts. This induces them to exercise, which is especially important on cold winter mornings. In the middle of the day a warm moistened mash should be given, about what they will eat within fifteen or twenty minutes, and at night, about an hour before they go to roost, a liberal feed of grain should be scattered in the litter.

#### Frequency of Feeding.

Some poultrymen feed their flocks twice a day, while others feed them three times a day. The best plan is to feed fowls in confinement three times a day and those having free range in summer twice a day. When there is a very long interval between feeds it is difficult to keep fowls busy which are kept in confinement. Idle fowls often contract bad habits, such as feather pulling and egg eating, besides going out of condition from lack of exercise.

In case it is not convenient to feed three times a day, the moistened mash may be fed in the morning, and at the same time the noon feed of grain may be scattered in the litter, which will keep the fowls busy a great part of the day.

For those who can not conveniently feed their fowls early in the morning a good plan is to scatter grain plentifully in the litter after the birds have gone to roost. This grain will furnish feed for the early morning.

Some poultry keepers can look after their fowls only once a day. If this is in the morning, moistened mash may be fed, followed by throwing grain in the litter to furnish feed for the remainder of the day. If it is in the evening, before dark, a moistened mash may be given, and either after the fowls go to roost or in the morning, before daylight, grain may be scattered in the litter for eating during the day.

#### Amount of Feed.

It is impossible to state any exact quantity of feed that should be given to each fowl per day, as the appetites of the birds vary according to the conditions under which they are kept, the season of the year, and the kind of fowl, some being much greater eaters than others. The general rule is to keep the birds slightly hungry during the day, not giving all they will eat until just before roosting time. The birds should be handled now and then when they are on the perch, and if they are either too fleshy or too poor their rations should be modified.

### Importance of a Varied Ration.

In feeding grain the aim of the feeder should be to give a variety. No one kind of grain alone is best. Variety may be secured by mixing the grains or by feeding the different kinds of grain on different days. This variety is in accordance with nature. When on free range the fowls obtain a little of several different kinds of feed. Grain should not be made the sole feed, for then fat and not eggs is the usual result.

### Effect of Feed on Character of Egg.

In extreme cases the flavor and the odor of the feed have been imparted to the egg. Onions have been fed in sufficient quantity to bring about this effect. Feeds of high and objectionable flavor should not be fed by those who desire to produce a first-class article. In no case should tainted feed be allowed to enter into the ration. Feed also has an influence on the color of the yolk. Corn fed exclusively will give a deep yellow or highly colored yolk, while wheat fed alone will produce a much lighter-colored yolk. A fairly high-colored yolk is usually preferred and can generally be obtained by feeding a moderate amount of corn. Plenty of green feed also enriches the color of the yolk.

### THE DROPPINGS AS AN INDICATION OF HEALTH.

The condition of the droppings furnish a good indication of the hen's health. They should be of sufficient consistency to hold their shape, but should not be too solid. In color they should be dark, tapering off into grayish white. If the droppings are soft or pasty and of a yellowish or brownish color, it indicates too much carbohydrates or a lack of meat. If, on the other hand, the droppings are watery and dark with red splashes of mucus in them, it indicates too much meat. A greenish, watery diarrhea usually indicates insanitary conditions, either in the surroundings, the feed, or the water.

### MOLTING.

Where a specialty is made of producing winter eggs it is important that the hens shed their feathers early, so that the new plumage will be grown before cold weather begins. Henry Van Dreser has proposed a way by which it is possible to cause a flock of fowls to pass through the molting period early and uniformly. This method consists in withholding part of the feed for about two weeks, which stops egg production and reduces the weight of the fowls, and then feeding heavily on a ration suitable for the formation of the feathers and the general building up of the system. This method was tried at the West Virginia Experiment Station with good results. The hens molted more rapidly and with more uniformity, entering winter in better condition than similar fowls fed continually during the molting period on an egg-producing ration. Whether this method is employed or not, the fowls should receive a more nitrogenous ration than the one ordinarily fed. The addition of a little linseed meal during the molting period will aid in the production of a new coat of feathers. An increase in the amount of animal feed will also be beneficial.

### EXERCISE.

During the spring season fowls having free range get abundant exercise. Close confinement without exercise is not conducive to the best results, although the feed provided may be the best, for idle hens soon grow too fat to lay. It is almost impossible to give laying hens which are confined too much exercise. The fowls may be encouraged to exercise in various ways, such as feeding corn on the cob, suspending cabbage heads, beets, etc., so that the birds have to jump for them, and scattering grain in the litter. The litter should be from 4 to 8 inches deep, and may consist of straw (either cut or whole), hay, leaves, buckwheat hulls, shredded corn fodder, or any convenient material of this nature. The hens should be kept hungry enough so that they will work diligently all day for the grain scattered in this litter, which should be removed whenever it becomes damp or soiled.

### AGE OF BIRDS FOR PROFITABLE EGG PRODUCTION.

There are people who have the right variety of fowls, who house and feed them properly, and yet who can not obtain eggs early in the winter because their fowls are too old. It is seldom that it pays to keep hens for laying after they are two and a half years old; not that they will not give a profit, but that younger fowls will give a greater profit. A great many poultrymen who make a specialty of winter-egg production keep nothing but pullets, disposing of the 1-year-old hens before it is time to put them in the winter quarters. Early hatched pullets, if properly grown, ought to begin laying in October or early November and continue to lay through the winter. Yearling hens seldom begin laying much before the 1st of January and older hens not until later. It is the November and December eggs that bring the high prices. The laying breeds should begin laying when about 5 months old; general-purpose breeds at 6 months, and the meat breeds at 7 or 8 months.

### RAISING CHICKENS.

To be successful in raising chickens it is necessary to have healthy and vigorous breeding stock, for the lack of vigor in the newly hatched chicks is often traceable to weak parents. Only the most vigorous and the best grown birds should be put in the breeding yards. Each bird should be full of life and energy and free from any serious deformity. Yearling hens are usually better than pullets for breeders, for the reason that the hens are more mature and do not lay so many eggs during the early winter, and consequently do not reduce their vitality so much before the breeding season. Vigorous hens 2 to 4 years old can often be advantageously retained in the breeding yard. The male bird chosen should be young and active. An early hatched well-developed cockerel is usually satisfactory, or a good vigorous yearling or 2-year-old cock may be chosen. The hens used for breeding purposes should be given the best care possible; they should be provided with large runs and should not be forced for heavy egg production during the early winter.

### NUMBER OF FEMALES TO ONE MALE.

Of the light, active breeds, such as the Leghorns and Minorcas, 1 male will be sufficient for a pen of 12 to 15 females under ordinary conditions. In the case of the medium-sized fowls, such as the Plymouth Rocks and Wyandottes, 1 male should be provided for every 10 or 12 females. With the heaviest breeds, like the Brahmas and Cochins, 1 male should not be mated with more than 10 females. Where 20 or 30 females are kept in one flock no better means of securing fertile eggs is known than to keep 2 male birds, allowing one of them to run with the hens one day and the other the next day, having a coop or extra pen in which to keep the one not with the hens.

### HATCHING CHICKS.

There are two methods of hatching and brooding chicks—the natural, in which the chicks are hatched and brooded by hens, and the artificial, in which they are hatched in incubators and brooded in houses or in separate outdoor brooders. For the person with a small flock the natural method will be found the easier and less expensive. For the person, however, who has a hundred or more hens and intends raising large numbers of chicks, and for all who keep only the nonsitting varieties, the artificial method is the more practical. There is also the added advantage with the latter method of being able to hatch chickens at any time of the year.

### Eggs for Hatching.

The eggs intended to be incubated should be kept at a rather cool temperature, 50° to 60° F. It is not advisable to keep them longer than two weeks before being incubated, and the fresher they are when set the better the chances of a good hatch and strong chicks. Only well-formed eggs with good strong shells should be set.

**Number of eggs to hen.**—This depends on the season, the size of the hen, and the size of the eggs. The usual number for an average-sized hen in the spring is 13. The same hen set in winter should not be given more than 11. After the middle of May she can take care of 15. It is better to give less than she can cover than to give more, for when too many are given most of the eggs, if not all, will be chilled at some period of the incubation.

**Testing the eggs.**—Each sitting should be tested for the removal of the infertile eggs, which gives a better chance to those left. If there are many infertile ones, and several hens have been set on the same day, some of the hens may be reset. The eggs should be tested about the sixth or seventh day. Egg testers are sold by incubator manufacturers and by dealers in poultry supplies, or a homemade tester can be made in a few minutes from a small pasteboard or wooden box of such size and dimensions that a common hand lamp, a lantern, or a candle can be placed in it. A hole should be cut in the top directly over the flame and another a little smaller than an ordinary sized hen's egg in one side opposite the flame. The testing should be done in a dark room. If the pen in which the hens are set can not be made dark enough, it is best to test after dark. In testing, the

light shining through the egg, held against the hole in the side of the box, shows the condition of the egg. An infertile egg is clear, while the fertile egg will show a spiderlike formation, a center with long, crooked threads, leading outward, and this formation will float as the egg is turned. The infertile eggs may be removed and used for cooking purposes.

#### Hatching Chicks with Hens.

The quarters for sitting hens should be comfortable and convenient. The hen should be free from disturbance, and be provided with a yard or run. A good nest for medium-sized hens is a box 12 by 14 inches, and 12 or 14 inches high. For large hens the nest should be 16 by 16 by 16. The narrow strip at the bottom of the front of the box should be 4 to 5 inches wide, according to the height of the box. (See fig. 11.) Barrels, half barrels, and boxes of various kinds may be used. Hay, straw, or excelsior makes a good nesting material, and this as well as the hen should be dusted with a good insect powder. When a hen is not to sit in the nest in which she has been laying, it is best that she be moved after dark, for the majority of hens will then settle down more quietly in their new quarters than if moved during the day.

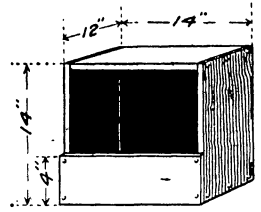


FIG. 11.—Nest for a sitting hen.

**Feeding sitting hens.**—Sitting hens should be well fed. Grain should be left where they can get it whenever they desire to come off the nest. Their feed should consist mostly of a variety of whole grain, such as corn, wheat, and oats. The feed a sitting hen requires is that needed for her bodily maintenance. Very little vegetable or meat should be given, for too much vegetable feed would tend to loosen the bowels, and too much meat food would tend to stimulate a desire to quit sitting and begin laying.

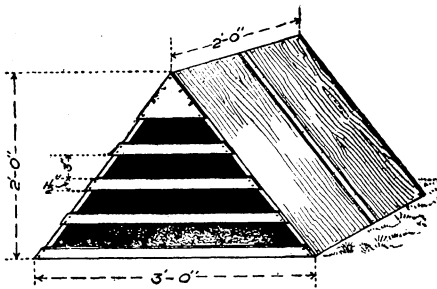


FIG. 12.—A-shaped coop for hen and chickens.

**Taking chicks from nest.**—Chicks should be removed from the nest about twenty-four hours after the first chicks are hatched. By the time the first chicks are a day old they want to get out from under the hen and move about, which is liable to make the hen restless and often causes her to leave the nest.

**Number of chicks to a hen.**—If the weather is cold, 10 to 12 chicks are enough for 1 hen. As the weather becomes warmer a few more may be given, but it is seldom advisable to give more than 15. The best place for the young chickens is an orchard which furnishes an abundance of shade and also admits plenty of sunlight.

**Coops for hens and chickens.**—The simplest coop is the common A-shaped coop (fig. 12). It is quickly and easily made. This coop

may be made either with or without a floor. A floor is desirable, except during warm weather and where the soil drains quickly.

Another good coop is the box coop (fig. 13), which in some respects is preferable to the A-shaped coop, for in the latter the hen can stand upright only near the middle of the coop, while with the box coop the entire floor space is available for her and the chickens. The box coop is also more easily cleaned. If desired, a small covered run can be made for each coop. This is especially desirable if there is danger of losses from cats, hawks, etc.

#### Incubators and Brooders.

**Incubators.**—There are several good incubators on the market, any one of which, if properly handled, will be found satisfactory. More depends on the operator in most cases than on the incubator. In buying an incubator the order should be placed early without waiting until the purchaser wishes to begin operating it. Spring is a busy time for the incubator companies, and it is often impossible for them, no matter how well equipped they may be, to fill an order the same day it is received. Again, shipments are often delayed by the transportation companies. It is also advisable for every beginner to have his machine some time before he desires to fill it with eggs, in order that he may become fully acquainted with its operation. A book of instructions accompanies every incubator, which makes it

unnecessary to go into details here. Probably the most common cause of failure with incubators is carelessness and neglect in attending to the machines.

For more details regarding incubators, see Farmers' Bulletin No. 236, entitled "Incubation and Incubators."

**Brooders.**—The successful growing of chicks in brooders is much more difficult than

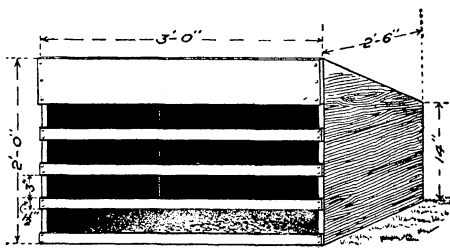


Fig. 13.—Box coop for hen and chickens.

the successful hatching of eggs in the incubator, because the artificial brooding of the chicks is more foreign to nature.

On a large plant brooder houses are an important part of the equipment. On small plants either indoor brooders in a small house or outdoor brooders are used. Brooders may be purchased from the manufacturers or through poultry supply firms. Manufacturers usually overrate the capacity of the brooders, for while a 100-chick brooder may be large enough for 100 chicks when first hatched, it will not be large enough for that number after they are a few days old.

The chicks are usually left in the incubator until they are about 24 hours old, when they are placed in the brooder, which should have a temperature of 90° to 95° F. This temperature should be gradually reduced until a temperature of about 70° F. is reached, when the chicks are about 4 or 5 weeks old. However, the temperature after the first day or two should be governed largely by the action of the chicks and not by the thermometer. Crowding of the

chicks to the outside of the brooder, panting or breathing hard, indicates too much heat; on the other hand, crowding and huddling about the heater indicates the need of more heat. Where they spread out comfortably at night part way between the heater and brooder walls, or just inside the fringe, where a hover is used, it is a safe indication of the right amount of heat. Chicks must be kept warm while at rest, and should always have a warm place ready for them to run to when they feel chilly. They should not be allowed to huddle together outside the brooder, but should be placed inside until they learn to go there of their own accord.

The natural method of applying warmth to chicks is to their backs, and it is a generally accepted fact that in artificial brooding the heat should be supplied from overhead with a very moderate warmth from the floor. Experience has generally shown much bottom heat to be conducive to weak legs.

Pure, fresh air is as essential as heat. The most common way of supplying this air is in connection with the heating system, with a constant circulation of warm air coming in around the heater.

Cleanliness is essential, and brooders should be cleaned and aired every day, if possible, and the floor sprinkled with sand or similar material to absorb the droppings. The water fountains or dishes and the troughs used for soft feed should be kept perfectly clean.

Incubator chicks at first are generally free from lice, but during warm weather lice are apt to find their way to the brooder and it is well to keep a sharp lookout for them.

The chicks should be allowed to use the brooder until they are from 6 to 10 weeks of age (depending largely on weather conditions and the development of the chicks) when they may be removed to colony houses or to coops.

#### **FEEDING AND CARE OF CHICKS.**

There are two systems in vogue for the feeding of chicks as well as for older fowls—dry feeding and wet feeding. The former is the simpler and easier one. The beginner is advised to adopt the method he thinks he would prefer or would find more convenient and follow it until he has a good reason for modifying or changing it. Choose the one or the combination of the two most suited to your circumstances. There are various methods of dry feeding, just as there are various methods of feeding rations composed in whole or in part of moistened mash or cakes. The grains may be fed whole or cracked, or a part ground and mixed together, making what is called a "dry mash." The feed may be kept before the chicks all the time in hoppers or troughs, or a part of it may be scattered in litter to induce them to take exercise. Beginners are usually more successful with a dry grain chick feed, for the reason that moistened mash is thrown down carelessly in considerable quantities and soon become soiled with the droppings and begin to ferment.

The first rule for getting a good profit from poultry is to get the chicks hatched early, and the next is to keep those chicks growing so that they will reach laying maturity before the commencement of cold weather. There is no profit in keeping a chicken just alive, whether it is intended for laying stock or for the market. One rea-



son why more care should be exercised in feeding chicks than in feeding fowls is that the former know less than the latter as to what is good for them. The healthy chick is a hungry thing and will eat what is given it, and the digestive organs being weak are less able to dispose of objectionable feed than are those of older fowls.

**The first feed.**—The chicks should not be fed until they are 24 hours old. Nature has provided for this by the absorption of the egg yolk into the chick's abdomen just previous to hatching. It is essential that this feed should be digested and assimilated before any other is given to them. Many people are in a hurry to start the chicks growing and hurry feed into their crops before the system is ready to take care of it. This results in bowel trouble and very often in the death of the chick. For the first meal a hard-boiled egg chopped fine, shell and all, mixed with three times its amount of stale bread crumbs, is good. In fact, boiled eggs mashed and mixed with three or four times their bulk of stale bread or cracker crumbs is excellent for pushing the young chicks along for the first week or two. However, hard-boiled eggs are concentrated feed, and if fed long and in much quantity are likely to cause bowel trouble. Stale bread soaked in whole milk or skim milk is also very good for feeding young chicks. After soaking, the milk should be squeezed out until the mass crumbles readily.

**Beginning use of grain feed.**—When the chicks are a few days old it is well to begin to feed a little grain. Millet seed, finely cracked corn and wheat, "pinhead" oatmeal, and broken rice may be scattered in the litter or short grass about the coop or brooder. It will pay to sift the cracked corn and wheat through sieves, so as to remove both the meal and the larger pieces. A very good mixture of cracked grains for chicks is 2 parts wheat, 2 parts "pinhead" oatmeal, 1 part corn, 1 part rice, and 1 part millet seed. Another good mixture is 10 pounds cracked wheat, 4 pounds cracked corn, 2 pounds millet seed, 2 pounds cracked hulled oats or pinhead oatmeal, and 1 pound fine beef scraps. There are also many prepared chick feeds on the market which are very good.

**Frequency of feeding.**—Young chicks should be fed a little at a time and often. They should be fed early in the morning and just before going to bed at night, and not less than three times in the intervening period. For the first two weeks they may be fed three meals of soft feed and two of hard, and after that age two of soft and three of hard, feeding less soft feed as they grow older. No more moistened soft feed should be given at one time than they will eat up clean. If any is left it should be removed, for nothing causes more bowel looseness and dysentery among young chicks than sour feed. The finely cracked grains may be safely used from the start, but the chicks do not as a rule grow as rapidly as when a part of the feed is ground. When the chicks are from four to six weeks old, the frequency of feeding may be decreased to four times a day.

**Green feed.**—Green feed must be supplied in some form. If the chicks are cooped on young grass they will help themselves, but if confined in small yards green feed should be given them. To be easily assimilated, some tender and easily broken green stuff should be furnished, such as finely cut grass from the lawns, lettuce leaves, onion tops, chopped fine, or boiled vegetables.

**Animal feed.**—When on free range the chicks pick up insects and worms. These are most abundant during the spring and summer, and it is at this time that the chickens thrive. When they can not get these abundantly, animal feed must be furnished in some other form. For the youngest chicks the hard-boiled eggs are sufficient, and as the chicks grow older beef scraps and green cut bone may be fed.

**Milk.**—Young chickens are fond of milk. It is highly nutritious and promotes growth, and may take the place of other animal feed to some extent. Skim milk is excellent; if whole milk is fed it is well to dilute it with one-third to one-half of water.

**Grit.**—Grit is another necessity. A dish of chick-size grit should be always before them, that they may help themselves.

**Water.**—Fresh, cool water should be constantly accessible, so that a drink can be taken whenever wanted. Many cases of cramps are caused by letting the chicks become thirsty and then fill up on water.

**Charcoal.**—Many successful poultrymen keep charcoal before the chicks, while others equally successful never use it. Considering the number of successful growers who use no charcoal, it can not be said that there is much need of keeping it always before chicks, but if they are not thrifty it is one of the simple things to supply before changing feed or beginning to give medicine.

**Johnnycakes, etc.**—Where only a few chicks are raised the feeding of johnnycakes is often practiced, but when so many chicks are kept that the baking of cakes becomes burdensome mash is preferable. Add a little soda to sour milk and stir in corn meal to make a stiff batter. The addition of a few infertile eggs will improve the cake. Bake until well cooked through. Make the cake thick so as to reduce the proportion of crust.

Other cakes may be made as follows: One pint of corn meal, one-half pint bran, 1 teaspoonful meat meal, 1 raw egg, 1 teaspoonful soda, add water to make stiff batter, and bake two hours.

Ten parts corn meal, 3 parts wheat middlings, 1 part meat meal, by measure; mix with water or skim milk, and bake.

**Exercise.**—From the very first chicks should be induced to exercise, for activity is a prime factor in promoting health and growth. Feed grain in the litter and make them scratch for it. A little fine chaff or finely cut clover makes a good litter.

**Teaching the chicks to roost.**—It is often advisable to teach the chicks to roost when 8 to 12 weeks of age. When they are allowed to remain on the floor it is difficult to keep them clean and to keep them from crowding. If wide roosts—3 to 4 inches—are used there is but little, if any, more danger of crooked breasts than if the chicks are allowed to remain on the floor. The chicks can generally be taught to roost by putting the perches near the floor and placing with them one or two old hens or older chicks that are in the habit of roosting. If this plan is inconvenient or does not prove effective, the chicks may be placed on the perches after dark for a few nights until they have learned to go there of their own accord.

**Separating the sexes.**—If convenient the sexes should be separated, for both the cockerels and the pullets will develop better. In the case of the more precocious breeds they should be separated when removed from the hen or brooder. The more slowly maturing varieties may

be allowed to run together somewhat longer, but in any case the separation should be made before the cockerels begin to annoy the pullets.

## **BROILERS, ROASTERS, AND CAPONS.**

### **BROILERS.**

The rearing of broilers may be regarded as one of the specialties of the poultry business and does not appeal particularly to the farmer, but it can often be made a paying occupation in connection with an egg farm or as a winter employment for those whose regular occupation gives them plenty of leisure at that season. Great skill is required to bring this work to its highest perfection, and anyone contemplating the production of broilers on an extensive scale should not depend on written directions for his guidance, but should make a careful study of the market demands and should visit one of the successful broiler producers, for the practical experience of such men is the safest guide.

Broilers are young, plump chickens, weighing, when dressed, from three-quarters of a pound to 2 pounds, and are usually killed when from six to twelve weeks old. The name is derived from the fact that they are usually split down the middle and the halves broiled. The market demand to-day is for broilers of three sizes—squab broilers, small broilers, and large broilers. Squab broilers when dressed weigh from three-quarters of a pound to 1 pound each; small broilers, the size most in demand the greater part of the year, weigh from 1 to 1½ pounds each, and large broilers from 1½ to 2 pounds each. In most American markets a yellow-skinned and yellow-legged bird is preferred, but this is not of as much importance as good quality of meat. The raising of broiler chickens until the finishing period is reached is practically the same as the raising of chickens for other purposes. The main point is to keep them growing rapidly.

**To finish broilers for market.**—A fat broiler is quite a rarity; the best that can be done, in general, is to have it plump, for the natural tendency of the chick is to use all nutriment for growth and development. When the birds are nearly large enough for the market they should be given all the fattening feed they will eat, and for this purpose corn in various forms should be fed freely. They will digest more feed if fed ground than if whole or cracked. A moistened mash consisting of about two-thirds corn meal and one-third bran by bulk is good. Cooked potatoes are good, and milk, with a little sugar added, will hasten fattening. Broilers may be sold alive or dressed according to the discretion of the grower. If dressed this should be done according to the demands of the market to which they are to be shipped.

### **ROASTERS.**

For roasting, a young fowl about full grown, but still soft meated, is used, and to roast satisfactorily it must be moderately fat. Roasters are roughly classed as "small roasters" and "large roasters." The greatest demand is for small roasters weighing 4 or 5 pounds each, though the demand for large roasters weighing 8 or 9 pounds

each is steadily increasing. Yellow skin and yellow legs are more generally demanded than a white skin and dark legs.

If the chickens have been properly grown and are in good healthy condition, about ten or twelve days' confinement in a pen and small yard, with fattening feed, will put them in as good condition as is desirable. They should then be dressed and packed according to market demands. The growing and marketing of roasters is an important business in some parts of the country, especially in the vicinity of large cities. Near Boston, in what is known as the "South Shore" district, the production of roasters engages the attention of many people, several of whom make it an exclusive business. A poultryman living near a good market or having good shipping facilities which bring a good market near him can often dispose of his surplus cockerels as roasters to good advantage.

### CAPONS AND CAPONIZING.

A capon is a castrated male bird. After being caponized the bird becomes more quiet, is more readily fattened, the comb and wattles cease to grow, and the plumage becomes heavy and glossy. Capons neither crow nor fight and are despised by other fowls. They often show a great fondness for little chicks, and instances are not uncommon where they have been utilized in rearing broods of chickens. In many eastern markets the prices paid for dressed capons range from 20 to 30 cents a pound. The highest prices usually prevail from January to May, and the larger the birds the more they bring a pound. For this reason the larger breeds—such as the Brahma, Cochins, Langshans, Plymouth Rock, or Wyandottes—are the most suitable. If well grown, a capon will weigh from 10 to 12 pounds at 1 year of age.

Fowls hatched early in the spring can be caponized before hot weather comes, which is an advantage, although no ill results should follow the operation at any time of the year if it is properly done. Generally speaking, the bird should be from 2 to 3 months old and weigh about 2 pounds, depending largely on its development. A good set of tools is indispensable and can be purchased for from \$2 to \$3. As a complete set of instructions is furnished with each set it is unnecessary to go into details here. The beginner should, however, operate on several dead cockerels before attempting to operate on a live one.

After caponizing, the bird should be given plenty of soft feed and should have plenty of water to drink. The capon begins to eat almost immediately after the operation is performed, and no one would suppose that a radical change had taken place in his nature. Leave him to himself, as for the time being he is his own doctor. It is well, however, to look him over two or three days after the operation has been performed, for sometimes air gets under the skin, causing a slight swelling or "wind puff." This can be relieved by pricking through the skin at one side of the swelling with a sharp needle and gently pressing out the air with the hands. The wounds will heal within ten days from the operation. The capons should be fed nourishing but not fattening feed, the object being to keep them growing. They should be allowed to grow until about a year old, depending of

course largely on their maturity, some breeds maturing much more rapidly than others.

About three weeks before marketing place the fowls in small yards and feed them three or four times a day, giving plenty of corn and other feed, or fatten them in one of the ways indicated in the section following on fattening poultry. Corn meal and ground oats, equal parts by weight, moistened with water or milk, makes a good mash for fattening capons.

In dressing capons leave the head and hackle feathers, the feathers on the wings to the second joint, the tail feathers, including those a little way up the back, and the feathers on the legs halfway up the thigh. These feathers serve to distinguish capons from other fowls in the market. Do not cut the head off, for this is also a distinguishing feature of the capon, on account of the undeveloped comb and wattles.

### **FATTENING POULTRY.**

Four methods of fattening poultry are practiced in this country, viz: Pen fattening, crate fattening, machine cramming, and hand cramming. The first two are probably the most common to-day, while the third is gaining rapidly as its results are becoming better known, and the fourth is used only where but few birds are fattened.

#### **PEN FATTENING.**

Pen fattening is practiced by a great many people who do not have the time and inclination to use other methods. The essentials of pen fattening are quiet, darkness, except at feeding time, and plenty of soft feed given at regular intervals, usually three times a day. Birds may be kept in flocks of 15 or 20, but the sexes should be separated.

#### **CRATE FATTENING.**

In crate fattening a few fowls are confined in crates and fed from a trough. A crate 6 feet long, 18 inches high, and 18 or 20 inches wide is suitable and is large enough for a dozen birds. Sometimes such a crate is divided into two or three compartments, 4 to 6 birds being placed in each compartment. But little room for the birds to move about is desirable, for the less exercise a bird obtains the more readily does it fatten. The top, back, and ends of the crates should be solid if they are to be placed outdoors, but if they are to be in a building they may be built of lath or slats. These slats should be 2 inches apart in front, so as to permit the birds to eat from the troughs, which are hung just outside of the coop. The slats of the bottom of the coop should be about 1 inch apart to permit the droppings to fall through. In indoor feeding the crates should be placed in a dark room, and just before feeding enough light should be admitted to allow the birds to see to eat. They are usually fed three times a day, and are permitted to eat for half an hour at a time, when the room is again darkened and the uneaten feed removed.

### MACHINE CRAMMING.

For the best results a machine is essential, especially for the last ten days, for otherwise the birds will not eat nearly so much as they can digest and assimilate.

Figure 14 shows a cramming machine in operation at one of the large poultry establishments in New York State. A reservoir under which is placed a small force pump operated by means of a lever worked by the foot is placed on a tripod. A tube is fixed to one end of the pump, through which the feed passes when the lever rod is lowered. This tube is of rubber or metal. If rubber, it may have a metal point. Metal tubes are more easily kept clean. The feed is placed in the reservoir, and is made into the consistency of thick cream. There are several ways of holding the bird, but the following

will be found simple and effective: Fold the wings and grip the bird firmly either between the right elbow and side of the body, as shown in the illustration, or between the left elbow and the body, whichever is the more convenient. The head is grasped in the left hand, the first finger being placed in the mouth to keep it open. The tube is placed in the mouth and the bird is gently drawn on until the end of the tube reaches the crop, the neck being elongated as



FIG 14.—Cramming machine in operation.

much as possible. The lever bar is gently lowered by the foot and the food is thus forced into the crop. One hand is kept on the crop and as soon as it is sufficiently full the foot is removed from the lever and the bird is gently removed. The operator soon learns to know when the crop is full. No stated amount that should be fed to an individual can be given, for the quantity varies with the size of the crop. Great care should be taken in preparing the feed to see that there are no lumps, for the tube is small and easily becomes blocked.

### HAND CRAMMING.

Hand cramming is a good system where but few fowls are being fattened, but would be found rather laborious where many are fat-

tened. The feed is made into boluses, or balls, which should be about 2 inches long and one-half inch in diameter. A large number of these are prepared before commencing to feed. The operator sits on a stool or box, firmly grips the fowl between his knees, and elongates the neck, holding the head in a similar manner to that described in using the cramming machine. He then dips a bolus in skim milk or water and forces it into the bird's mouth, pressing it down the throat with his finger. The neck above the bolus is then gripped with the thumb and first finger, which are run downward along the neck, forcing the bolus into the crop. It will probably take from 14 to 18 of these boluses to fill the crop, depending on its capacity. Some feeders practice this method in connection with crate fattening. The attendant, after feeding in the crates, feels the crop of each bird, and any not having a sufficiently filled crop are crammed in the manner described.

#### **FEED FOR FATTENING.**

Fattening birds should always receive soft feed. As they have no exercise they require a feed that can be quickly and easily digested. The following mixture is fed at the New York establishment referred to under the description of the cramming machine: 100 pounds finely ground barley, 100 pounds finely ground corn, 100 pounds finely ground oats (with hulls sifted out), to which mixture is added 10 per cent of beef scraps. Buttermilk or skim milk is used for mixing, the former being preferred. A little salt is sometimes added. The birds are fed twice a day at intervals of twelve hours, and are crammed for about three weeks. It is important that the intervals between the feedings should be as nearly equal as possible.

Another ration may be made as follows: 100 pounds ground oats, 100 pounds ground corn, 50 pounds flour, 4 pounds tallow.

#### **MARKETING POULTRY AND POULTRY PRODUCTS.**

A large part of the profit in poultry keeping often depends on the marketing of the products, and the producer should study the market demands as to how, where, and when to dispose of the products to the best advantage. An attractive appearance is of prime importance, and the producer should study the details of killing, dressing, and packing in order to arrange the products in the best possible manner. The requirements for dressing and packing vary somewhat in different markets, and the producer should learn any special requirements of the market to which he intends shipping.

#### **KILLING, DRESSING, AND PACKING POULTRY.**

**Killing.**—The birds should be kept without feed from eighteen to twenty-four hours before killing, unless they are to be drawn, in which case they should have no feed for at least ten hours before killing. In either case they should have no water to drink for at least eight hours before killing. When ready to kill, suspend the fowl by the legs and, using a knife, cut the vein at the back of the throat

through the mouth. As soon as this vein is cut run the point of the knife through the roof of the mouth into the brain, which causes the bird to lose all sense of feeling. Instead of piercing the brain the fowl can be paralyzed by a blow on the head.

**Dry picking.**—In most markets dry-picked birds are preferred. Immediately after killing, while the bird is still bleeding, the picker should remove the feathers, being careful not to tear the skin. If the picker waits until the bird is partially cold, the feathers will be removed with difficulty. As soon as picked the fowls should be hung in a cool place until thoroughly cold. If the weather is warm and fowls are to be packed in ice, they should be placed in a tank of ice water and left until all the animal heat has left the body.

**Scalding.**—When birds are scalded before removing the feathers they are immersed in hot water, which should be a little below the boiling point, as soon as they are through bleeding. The birds should be immersed three or four times and then picked clean, care being taken not to break the skin. The fowl should next be “plumped” by dipping it in nearly boiling hot water for eight or ten seconds and then placing it in cold water, where it should remain for fifteen or twenty minutes. Be careful not to overscald, as this will cause the outer surface of the skin to rub off. If the fowls are to be shipped dry they should be hung up until the skin becomes thoroughly dry. If they are to be packed in ice they may be left in the cold water for several hours or until they are to be packed.

**Drawing.**—When the poultry is to be drawn this should be done before the bird is cooled. A slit should be made from near the end of the keel bone toward the vent, large enough to admit the fingers. Then cut carefully around the vent and pull out the intestines, leaving in everything else unless the market requirements are otherwise.

**Packing.**—When the birds have been thoroughly cooled they are ready for packing. Packages for dressed poultry vary greatly, but they should be neat and clean and small enough to be easily handled. The inside of the box or barrel should be lined with clean, unprinted paper. Pack the birds solidly so that they will not shift in the package, but be careful not to bruise them. For delivery to retail customers pasteboard boxes of sufficient size to hold one or two birds are very satisfactory. When poultry is to be packed in ice, barrels are generally used, packing them with alternate layers of birds and ice, the latter forming the top and bottom layers.

### SHIPPING LIVE POULTRY.

Poultry of all kinds can be shipped alive, and will often net the shipper as much as when dressed. Good live fowls will usually bring more than the same fowls poorly dressed. For shipping live poultry to market well constructed slatted crates are desirable, as these crates provide for ventilation. This is important, for in crowded express cars the crates are frequently piled on top of one another. Overcrowding is to be avoided, and if large coops are used they should be equipped with partitions to prevent the birds being thrown together at one end when the crate is tipped in handling. If possible place only one variety in a coop or in one division of a coop.



## **SORTING, PACKING, AND SHIPPING EGGS.**

Eggs to be placed on the market should be carefully sorted and packed as to size, shape, and color. It is better not to put eggs having different colored shells in the same package, neither should eggs varying much in size be placed in the same package. Every egg should be perfectly clean, and if slightly soiled it may be wiped clean with a damp cloth. If badly soiled, the eggs should be discarded, for the washing required to clean them injures their appearance. The discarded eggs can be disposed of at some of the cheaper and less exacting markets. Eggs may be placed in large shipping cases or in small pasteboard boxes, according to how they are to be marketed.

### **TESTING EGGS.**

When supplying a fancy trade with eggs, or on receiving eggs from outside sources, it is often desirable to determine their freshness. The method generally used by commission merchants for this purpose is known as "candling," and consists in holding the egg between the eye and a light so as to note the contents. This should be done in a darkened room, using one of the egg testers on the market or the simple homemade tester described on page 28 under the heading "Testing the eggs." The air space in a perfectly fresh egg is very small, and as the egg loses part of its contents by evaporation this air space increases in size with the age of the egg. Fresh eggs should appear clear and bright, showing no dark spots. Those accustomed to "candling" soon learn to detect stale eggs with a good degree of accuracy and rapidity.

Another method employed by some who have not a great number to test is to put the eggs in a basin of water. If good they will lie on their sides; if bad they will stand on the small ends. The older the egg the more upright it stands, and if very old it will be suspended in the water or even float on the surface.

### **METHODS OF SELLING.**

There are three general ways in which poultry products may be marketed: First, selling direct to the consumer; second, selling direct to the retailer, and, third, selling to commission merchants for sale on the open market.

**Selling direct to the consumer.**—This is generally considered the most profitable method of disposing of high-grade goods, for the charges of middlemen are eliminated. The producer is often so situated that he can build up a retail trade among the families of a neighboring city or village, delivering his goods direct to the customer once or twice a week, or oftener if desirable. In this way he can usually secure a substantial increase over prices paid in the open market. This is especially true in the case of strictly fresh eggs. It is also often possible to secure customers in a city that is within reasonable shipping distance, expressing to them a stated amount of eggs and dressed poultry at regular intervals (once or twice a week). Hotels, restaurants, and clubs are good customers, which can be supplied in this way by contract.

**Selling direct to the retailer.**—There are often many grocery and provision dealers who cater to a select trade to whom the producer can sell regular supplies of fresh eggs and poultry.

**Selling to commission merchants.**—This is the simplest method of disposing of the produce, as it does away with the expense and trouble involved in a private trade, but the returns are usually not so great, except when dealing with certain commission houses that have built up a fine trade along certain lines.

Which of the above methods will pay him best is a question for the producer to decide for himself. It is largely a question of market conditions, personal circumstances, and the kind of business done, whether large or small.

### PRESERVING EGGS.

Many people wish to preserve eggs for home consumption, and so a few methods are given which have proved sufficiently satisfactory to warrant the preservation of eggs for home use.

Eggs to be stored should be: First, from hens that have no males running with them, because an infertile egg keeps longer, even without the use of a preservative, than a fertile egg; second, perfectly fresh, for not only will they keep much better, but if an egg which has begun to decay is placed in the same vessel with fresh ones it is likely to affect all the surrounding eggs, and, third, perfectly clean, for filth of any kind adhering to the shell will taint the preserving medium and thus taint the other eggs.

In placing eggs in the preservative be careful not to crack the shells. Keep them in a moderately cool room where the temperature may be kept fairly constant. A dry, clean cellar is a suitable place.

**Water-glass.**—Of the many methods which have been tried for preserving eggs on a small scale none has proved more successful than the use of water-glass (sodium silicate). This is a very cheap product that can usually be procured at not to exceed 50 cents a gallon, and 1 gallon will make enough solution to preserve 50 dozen eggs, so that the cost of material would not exceed 1 cent a dozen. Pure water that has been boiled and then cooled should be used. To each 15 to 20 quarts of water 1 quart of water-glass should be added. The solution should be prepared, placed in the jar or other suitable vessel, and the fresh eggs added from time to time until the jar is filled, but be sure that there is 2 inches of the solution covering the eggs. The eggs should not be washed before packing, for washing injures the keeping quality, probably by dissolving the mucilaginous coating.

**Limewater.**—A good limewater preservative may be made as follows: Thirty gallons of water, 10 pounds of salt, one-half bushel of finely slaked lime. After mixing thoroughly allow the solution to stand two or three days and then remove the clear liquid by dipping or by means of a siphon. Place the liquid in a tub or other suitable receptacle and place the eggs therein, or the eggs may be placed in the vessel first and the limewater poured over them. Have about 2 inches above the eggs. Limed eggs can be discerned by the roughness of the shell.

Before boiling eggs which have been preserved in the foregoing

ways, the shell should be punctured with a needle, otherwise it is apt to crack as soon as placed in hot water, owing to the pores being closed.

**Salt and bran.**—Eggs can be preserved for several months in dry salt. Have at least 2 inches above the upper layer of eggs. Packing in bran has also been found satisfactory in many cases.

**Cold storage.**—This is undoubtedly the best and most practical method for preserving eggs in large quantities in a commercial way. As the processes by which a low temperature can be maintained for an indefinite period have become more and more improved the greater has been the number of eggs so stored, until the cold-storage business has reached such proportions that it has a considerable influence on the price of eggs, tending to lower it in winter and raise it in summer. Cold storage, however, is not usually available or practicable for preserving eggs in a small way for home use.

### **DISEASES, BAD HABITS, AND INSECT PESTS.**

It is not the purpose of this article to go into the details of the various diseases of poultry, but simply to consider briefly some of the common ailments and to give some of the simple remedies. Prevention is better than cure, so it will be well to consider some of the more frequent causes of diseases in general. Filth, dampness, improper ventilation, improper feeding, and the introduction of infected birds into the yard may be mentioned as some of the most common causes.

### **IMPORTANCE OF CLEANLINESS.**

Everything about a poultry house should be kept reasonably clean. As a rule droppings should be removed daily, for the accumulation of excrement harbors parasites, contaminates the air, and breeds contagion. After the dropping boards have been cleaned, they should be sprinkled with road dust, coal ashes, land plaster, or air-slaked lime to absorb the liquid excrement. Nests in which straw or other similar material is used should be cleaned out and new straw put in about once every three or four weeks, or oftener if it becomes damp or dirty.

The quarters should be thoroughly whitewashed at least once a year, late in summer or early in the fall. The whitewash can be made by slaking lime in boiling water and then thinning to the proper consistency for applying. The addition of 4 ounces of carbolic acid to each gallon of whitewash will increase its disinfecting power. The runs should be plowed occasionally in order to bury the accumulated droppings and also to turn up fresh soil.

### **DISEASES.**

When a disease has become firmly established in a flock or a single bird is badly affected, the free use of the hatchet is usually the most practical method, as it does not pay to spend two dollars' worth of time in curing a one-dollar bird. Slight cases, however, can often be cured with but little trouble. In nearly every instance it is better to remove the well fowls and put them by themselves, and in the case of infectious disease the premises should be thoroughly disinfected.

**Apoplexy.**—This is a disease of the brain caused by the rupture of one of the blood vessels. The bird is attacked suddenly and falls down, apparently dead or nearly so. The usual cause is too high feeding, but it may also be due to some other provocation, such as sudden fright, violent exertion, or straining in laying eggs. Fowls are sometimes found dead on the nest or under the perches. There is usually no previous warning, and so in most cases treatment is impossible, as the bird usually dies almost immediately. When, however, the sufferer is still alive pierce a vein on the underside of the wing and let it bleed freely. This will reduce the pressure on the brain and often result in a cure. The bird should then be kept on a limited diet for some time in order to reduce the surplus fat. As preventive measures, regulate the diet and give plenty of exercise.

**Vertigo.**—This is also a disease of the brain and may be regarded as a minor kind of apoplexy. The bird shows giddiness, throwing its head upward, backward, or to one side. The gait is uncertain and staggering, the sufferer often running around in a circle. Sometimes the bird falls to the ground, fluttering and making convulsive movements with the legs. The bird can often be revived by holding its head under a stream of cold water. After this keep the bird in a cool and shady place for some time and regulate the diet.

**Bronchitis.**—Bronchitis is a cold accompanied by a rattle in the throat or by a cough, and may be caused by exposure to dampness or cold temperature or by drafts of air. In the majority of cases the removal of the cause and good care will result in a cure. Inhalation of steam or vapor from boiling water has been found beneficial. Giving a teaspoonful of equal parts of cider vinegar and water has proven successful in some cases.

**Catarrh.**—Catarrh is a form of cold that is quite common among fowls, and may be caused by dampness, drafts of air, or exposure to cold. It is indicated by a watery discharge at the nostrils, which later becomes more viscid. Remove the cause, keep the birds fairly warm, and give them plenty of easily digested feed. The injection of kerosene into the nostrils is also beneficial. This may be done with a small syringe, a medicine dropper, or a small oil can. If catarrh has become confirmed, the nostrils and throat should be cleansed with hydrogen peroxide and equal parts of water several times daily, and the nostrils greased with vaseline.

**Diphtheria.**—The marked symptom is the appearance of a diseased growth in the throat and inside of the mouth, resembling raised patches of whitish or pale-yellowish skin, which may invade the entire throat and mouth, often also appearing like ulcers or sores on the face, comb, and about the eyes. Make a swab of cotton tied on the end of a stick and swab out the mouth with hydrogen peroxide. Remove any of the growths that come away easily. This disease is very contagious, and any birds suffering from it should be removed from the flock and the premises disinfected.

**Roup, or contagious catarrh.**—The first symptoms of this disease are similar to those of simple catarrh, but as the disease advances there is often swelling of the sides of the head and the nostrils become closed with thick mucus, causing the bird to breathe through the mouth. If the swellings contain pus, they should be opened with a sharp instrument, the contents removed, and the wound treated with

a mild antiseptic, such as a 2 per cent solution of carbolic acid. The application of kerosene mixed with an equal part of olive oil has given good results in many cases. When a fowl has a bad case of roup, it is usually better to kill it, unless especially valuable.

**Pip.**—This is a condition of the tongue caused by some such ailment as a cold, which compels the bird to breathe through the mouth. The continual passing of air over the tongue causes it to become dry, hard, and scaly, especially about the tip. The best remedy is to remove the cause, also wet the tongue two or three times a day with a mixture of glycerin and water, equal parts.

**Bumble foot.**—This is caused by bruises on the bottom of the foot, and is often due to the fowls having to fly from rather high perches and alighting on hard and uneven surfaces. Remove the cause by lowering the perches. If the foot is swollen and the swelling is filled with pus, it should be lanced and the pus permitted to escape. The wound should then be washed out with a 2 per cent carbolic-acid solution, greased with vaseline, and wrapped with a piece of cloth.

**Cholera.**—This is a contagious disease caused by bacteria, and is usually brought in by the introduction of infected birds or by water or feed contaminated by the excrement of sick birds. It is also possible for fowls to be infected through wounds or even by the inhalation of germs in the form of dust. The symptoms include great thirst and the voiding of feces of which the part normally white is yellow. This is not a sure indication of the disease, for the same thing may occur as the result of other disorders. Diarrhea is generally a prominent symptom, the droppings being thin and voided frequently, and in the later stages the yellow portion may change to green; the fowl becomes depressed, the feathers become ruffled, the comb becomes pale or very dark, and the bird has a poor appetite. Sometimes the disease runs rapidly through a flock, destroying the greater part of the birds in a week, or it may assume a more chronic form, extend slowly, and remain on the premises for several weeks or months. Fowls affected with this disease usually die within thirty-six hours. Most so-called cases of cholera are simply diarrhea.

In most cases medical treatment for cholera has proved unsatisfactory. The best method of combating this disease is to carry out strict sanitary precautions as regards cleanliness and disinfection, and to totally destroy the carcasses of dead birds. Droppings should be burned or thoroughly disinfected by mixing with a 10 per cent solution of carbolic acid. Disinfect the building by spraying thoroughly with a 5 per cent solution of carbolic acid, and then whitewash.

**Crop bound.**—The crop sometimes becomes overloaded with feed, and its thin muscular walls become distended and partially paralyzed, so that the organ can not be emptied, or the opening into the lower esophagus may become clogged with a feather, a straw, or some other substance which the bird has swallowed. The crop is greatly distended and the mass of feed is rather hard and firm. In both cases the symptoms are the same and treatment should be conducted on the same principles. For treatment pour one-fourth to one-half ounce of melted lard or sweet oil down the throat and manipulate the contents of the crop with the hand in such a way as to tend to break up the mass. Unless the passage is closed the contents of the crop will usually pass away within a few hours. For a few days feed should be

limited in quantity. If the foregoing method is ineffectual and an operation becomes necessary, clip away the feathers from a portion of the crop and with a very sharp knife, lancet, or razor make an incision about  $1\frac{1}{2}$  inches long through the skin and the wall of the crop. Then carefully remove the contents of the crop with the finger, the handle of a spoon, or some other convenient object, and wash out the crop with warm water. Pass the finger, well oiled, into the esophagus to see there is no obstruction. Sew up the wall of the crop first and then the outer skin, using white silk or linen thread, being careful not to sew the two membranes together, and in a few days the wound will be healed. Feed sparingly on whole grains until the wound heals, and do not give any water for twenty-four hours.

**Diarrhea.**—This is caused by some irritation of the digestive system, and may be due to the quantity of the feed, the quality of the feed or drinking water, or to climatic conditions to which the fowl has been exposed. There is a general depression, roughness of plumage, and a loss of appetite, and usually frequent expulsion of soft, whitish, yellowish, or greenish excrement, the droppings becoming more liquid until severe diarrhea is present. When the affection is at all serious, the excrement may become mixed with mucus or blood. It is important that the cause be sought out and removed. See that the birds have comfortable quarters and that they are not exposed to drafts, cold or dampness. If taken early, diarrhea can often be checked by reducing the amount of green and animal feed and feeding largely on dry feed, eliminating the moist mash. Give a tablespoonful of sweet (olive) oil as a laxative to carry off any irritating matters that may be in the intestine. In severe cases give 5 to 10 drops of laudanum to each bird.

**Gapes.**—Gapes is caused by the presence of small worms, which are attached to the lining of the trachea or windpipe, where they cause much irritation and often death to young chickens. Gapes usually occur when the chicks are from 2 to 6 weeks old. Separate the well from the sick birds and clean the coops, pens, and feed and water dishes by disinfecting with a 5 per cent solution of carbolic acid. Sometimes the worms can be removed from the trachea by inserting a feather moistened with turpentine or kerosene. The oil will cause the dislodgment of the worms, and some will be drawn out with the feather while others will be expelled by coughing or sneezing. Place the chicks on a piece of paper, so that the worms may be caught and burned.

**Freezing (frostbite).**—If the comb or wattles of fowls become frozen, and it is discovered before they thaw out, apply snow or cold water to remove the frost, for this gradual thawing will often save them. Then apply vaseline to the affected parts twice a day.

**Scaly legs.**—This is caused by a mite which burrows under the scales of the feet and shanks, and is considered to be infectious, but does not spread rapidly. It is noticed most frequently in old fowls. The scales can be removed by soaking the feet and shanks in warm, soapy water and by rubbing or brushing them off with a toothbrush or nailbrush. After the scales have been removed apply sulphur ointment or equal parts of melted lard and kerosene. The frequent application of kerosene has also been found effectual without the previous soaking in water.

**Chicken pox, or sore head.**—This is a contagious disease caused by a fungus, and occurs in chickens, turkeys, pigeons, and sometimes in geese. It is quite prevalent and very destructive among young chicks in the Southern States. The disease appears as an eruption of yellow nodules about the beak, nostrils, eyes, and other parts of the head. These nodules reach their full development in five to ten days, when they emit a watery discharge, which later changes to a thick yellowish matter. As the disease progresses the birds grow thin and weak, and death results. In cases of spontaneous recovery, the nodules dry up and form crust, which later crumble away. The parasite causing it penetrates the skin of a healthy individual either through an abrasion, through punctures caused by bites of lice, etc., or less frequently through the normal skin. The disease is most prevalent during warm, damp weather, and consequently is most fatal to late-hatched chicks.

The following preventive measures should be employed: Keep affected birds from the premises; keep the houses clean and dry, and hatch the chicks early. Sick birds may be treated by applying carbolic ointment, or glycerin containing 2 per cent carbolic acid, to the affected parts twice a day. The sores may also be bathed with soap and water to loosen the crusts and subsequently sponged with a solution of copper sulphate (one-half ounce to 1 quart of water). When other treatments are unavailing, tincture of iodine may be sparingly used.

**Egg-bound.**—Irritation of the oviduct, causing the membrane to become dry and deficient in its normal lubrication, an abnormally large egg, or a too fat condition of the hen may cause difficulty in expelling an egg from the body and produce the condition known as egg-bound. If the egg remains in the oviduct for a considerable length of time inflammation is produced, which finally develops into decomposition of the tissues and results in death. Fowls when egg-bound are restless, going frequently on the nest, showing a desire to lay and, in general, giving evidence of being in distress. Later they become dull and listless, remaining in this condition until death if not relieved. The egg can usually be felt in the posterior portion of the abdomen. If the trouble is early discovered, inject a small quantity of oil into the vent, and gently try to work the egg out. If this treatment is unsuccessful, hold the lower part of the body in warm water for half an hour, or until the parts are relaxed; then treat as above. It may be necessary to break the egg, allow the contents to escape, and remove the shell in pieces. After removal of the egg give soft cooling feed.

Occasionally difficulty in laying an egg causes prolapsus or eversion of the oviduct. When this occurs the oviduct is partially turned inside out and protrudes from the vent. If the egg causing the trouble has not been expelled, remove it, wash the exposed portion of the oviduct with warm water, apply carbolated vaseline or lard, and return to its normal position by gentle pressure. In addition it is well to give the fowl 3 to 5 drops of fluid extract of ergot.

**Intestinal worms.**—Worms are frequently present in the intestines and ceca of chickens, particularly young chicks, often causing considerable loss. Practically the only way to determine that worms are present is to examine the ceca and intestines of dead chicks.

The worms are small and hairlike. Occasionally flat tape worms are found, but these are not very common. Chicks infested with worms go off feed and become thin and sickly looking.

In combating worms care should be taken to keep clean the soil over which the chicks run, and to move the runs each year or two if possible. Cleanliness in the house must also be observed. In treating affected birds, powdered areca nut (20 to 40 grains per fowl), administered either in mash or mixed with butter and made into pills, is an effective remedy. Powdered male fern (30 grains to 1 dram), or oil of turpentine (1 to 3 teaspoonfuls), alone or diluted with an equal bulk of olive oil, is also very good. It is well to follow any of these remedies with a dose of castor oil (1 to 3 teaspoonfuls).

**Limber neck.**—This disease, as its name indicates, is characterized by the limp condition of the neck, the fowl practically losing all control of the neck muscles, so that the head rests on the ground. This condition occurs in warm weather, and is caused by the fowls eating decomposed flesh in which a ptomaine has developed. This poison causes partial paralysis of the neck muscles and often results in the death of the birds. Maggots eaten by fowls do not cause the disease, except as they may contain the poison which they have obtained from the decaying flesh.

The best and most effective treatment is, of course, never to leave any dead fowls or other dead animals around, but to bury or burn all carcasses. Treatment of sick birds is not usually very successful, but a teaspoonful of castor oil is sometimes effective.

#### BAD HABITS.

**Egg eating.**—This habit sometimes becomes a serious vice, fowls becoming very fond of eggs when they have learned to eat them, and it often spreads from fowl to fowl. It usually begins through accident by eggs being broken or frozen. Be careful to see that this does not happen. See that the nests are properly supplied with straw or other nesting material and have them darkened, so that if an egg is accidentally broken the fowls will not be likely to discover it. Supply plenty of lime in the form of oyster shells, bone, or similar substances to insure a firm shell. As soon as it is discovered that a fowl has formed the habit the fowl should be removed, in order to prevent the spread of the vice. Once formed, it is difficult to eradicate, and the safest remedy is the death penalty.

**Feather eating.**—Fowls sometimes pluck feathers from themselves and from each other, which is often caused by too close confinement, by the presence of insect pests, or by improper feeding. When some of the fowls of a flock have formed the habit slightly, a wide range with a change of diet, including a plentiful supply of animal feed, and freedom from insect pests, will usually correct the evil. Above all see that the fowls have plenty of inducement to exercise. If the habit becomes well formed it is very troublesome and may necessitate the killing of some of the fowls in order to stop it.

#### INSECT PESTS.

Two classes of external parasites, popularly known as lice and mites, will be considered here. There are several varieties of lice



which attack poultry. They subsist mainly on the feathers and perhaps on the epidermic scales. They are found largely on the head and neck, under the wings and about the vent, and when present in large numbers they cause the fowls much discomfort. Persian insect powder (pyrethrum), powdered sulphur, and some of the various preparations on the market, such as the louse powders, are good in combating these pests. The hens can be dusted with one of these powders after they have gone to roost. Have the powder in a box with a perforated cover, grasp the fowl by the legs, and shake the powder well among the feathers. Dust at least three times at intervals of about a week in order to catch the lice which hatch out after the first dusting.

The mites subsist on the blood of the fowls and are not usually found on the bodies of the bird except when at roost or on the nest. During the day they inhabit cracks and crevices of the walls, roosts, and nests. Sitting hens are often so annoyed that they are compelled to leave the nests in order to relieve themselves of these parasites. The free use of kerosene about the nests and perches is useful in fighting mites. The walls of the house may be sprayed with kerosene, the operation being repeated every three or four days for two weeks. Insect powders are of little avail.

The following method has proved excellent in ridding houses of mites and lice when the weather conditions are such as to permit the birds being kept outside the house for five or six hours. Close all the doors and windows and see that there are no cracks or any other openings to admit air. Get an iron vessel and set it on gravel or sand near the center of the house; place in the vessel a handful of shavings or straw saturated with kerosene, and on these sprinkle sulphur at the rate of about 1 pound to every 90 or 100 square feet of floor space. Instead of using the shavings and kerosene the sulphur can be saturated with wood alcohol. When everything else is in readiness light the material and hastily leave the house. In case any anxiety is felt about fire, a glance through a window will show whether everything is all right. There is very little danger of fire when proper precautions have been taken to have plenty of soil beneath the vessel. Allow the house to remain closed for three or four hours, at the end of which time one can safely conclude that there are no living beings inside. Now throw all the doors and windows wide open so as to drive out the sulphur fumes thoroughly, and then the fowls may be allowed to enter. Let them in one by one, and as each enters catch it and dust it well with insect powder, which will destroy the lice on the birds. Tobacco dust is also good to use instead of insect powder. The birds and house have now been freed from vermin for the present, but the eggs of the insects have not been destroyed, and in a week another swarm will be hatched out. Therefore it will be necessary to repeat the operation once or twice before the pests are exterminated. After this care should be used to see that no strange fowl is admitted to the house or yard without having been thoroughly rid of lice, for one lousy hen will contaminate all the rest.